APPLICATION

Study field "Architecture and Construction" for assessment

Study field	*Architecture and Construction*
Title of the higher education institution	*Rīgas Tehniskā universitāte*
Registration code	*3341000709*
Legal address	*KAĻĶU IELA 1, CENTRA RAJONS, RĪGA, LV-1050*
Phone number	*67089300*
E-mail	*rtu@rtu.lv*

Self-evaluation report

Study field "Architecture and Construction"

Riga Technical University

Table of content

Self-evaluation report 2

Study field 8

1. Information on the Higher Education Institution/College 8

2.1. Management of the Study Field 18

2.2. Efficiency of the Internal Quality Assurance System 34

2.3. Resources and Provision of the Study Field 43

2.4. Scientific Research and Artistic Creation 68

2.5. Cooperation and Internationalisation 85

2.6. Implementation of the Recommendations Received During the Previous Assessment Procedures 90

Annexes 92

Other annexes 94

Architecture (47581) 95

Study programme 98

3.1. Indicators Describing the Study Programme 98

3.2. The Content of Studies and Implementation Thereof 102

3.3. Resources and Provision of the Study Programme 108

3.4. Teaching Staff 110

Annexes 122

Geomatics (47581) 123

Study programme 127

3.1. Indicators Describing the Study Programme 127

3.2. The Content of Studies and Implementation Thereof 133

3.3. Resources and Provision of the Study Programme 152

3.4. Teaching Staff 161

Annexes 170

Engineering of Regional Development and Urban Economics (42581) 171

Study programme 173

3.1. Indicators Describing the Study Programme 173

3.2. The Content of Studies and Implementation Thereof 175

3.3. Resources and Provision of the Study Programme 184

3.4. Teaching Staff 187

Annexes 199

Transportation Engineering (47582) 200
Study programme 202
3.1. Indicators Describing the Study Programme 202
3.2. The Content of Studies and Implementation Thereof 211
3.3. Resources and Provision of the Study Programme 222
3.4. Teaching Staff 226
Annexes 231
Civil Engineering (42582) 232
Study programme 234
3.1. Indicators Describing the Study Programme 234
3.2. The Content of Studies and Implementation Thereof 239
3.3. Resources and Provision of the Study Programme 248
3.4. Teaching Staff 253
Annexes 263
Architecture (51581) 264
Study programme 266
3.1. Indicators Describing the Study Programme 266
3.2. The Content of Studies and Implementation Thereof 269
3.3. Resources and Provision of the Study Programme 273
3.4. Teaching Staff 275
Annexes 292
Heat, Gas and Water Techology (42582) 293
Study programme 296
3.1. Indicators Describing the Study Programme 296
3.2. The Content of Studies and Implementation Thereof 304
3.3. Resources and Provision of the Study Programme 310
3.4. Teaching Staff 316
Annexes 328
Civil Engineering (51582) 329
Study programme 331
3.1. Indicators Describing the Study Programme 331
3.2. The Content of Studies and Implementation Thereof 337
3.3. Resources and Provision of the Study Programme 345
3.4. Teaching Staff 349

Annexes 360

Transportation Engineering (42582) 361

Study programme 364

3.1. Indicators Describing the Study Programme 364

3.2. The Content of Studies and Implementation Thereof 372

3.3. Resources and Provision of the Study Programme 380

3.4. Teaching Staff 384

Annexes 390

Heat, Gas and Water Techology (47582) 391

Study programme 394

3.1. Indicators Describing the Study Programme 394

3.2. The Content of Studies and Implementation Thereof 402

3.3. Resources and Provision of the Study Programme 409

3.4. Teaching Staff 414

Annexes 423

Civil Engineering (41582) 424

Study programme 427

3.1. Indicators Describing the Study Programme 427

3.2. The Content of Studies and Implementation Thereof 432

3.3. Resources and Provision of the Study Programme 443

3.4. Teaching Staff 447

Annexes 454

Innovative Solution in Geomatics (45581) 455

Study programme 458

3.1. Indicators Describing the Study Programme 458

3.2. The Content of Studies and Implementation Thereof 470

3.3. Resources and Provision of the Study Programme 483

3.4. Teaching Staff 490

Annexes 499

Heat, Gas and Water Techology (51582) 500

Study programme 503

3.1. Indicators Describing the Study Programme 503

3.2. The Content of Studies and Implementation Thereof 514

3.3. Resources and Provision of the Study Programme 522

3.4. Teaching Staff 528
Annexes 539
Civil Engineering (47582) 540
Study programme 543
3.1. Indicators Describing the Study Programme 543
3.2. The Content of Studies and Implementation Thereof 548
3.3. Resources and Provision of the Study Programme 557
3.4. Teaching Staff 562
Annexes 572
Geomatics (42581) 573
Study programme 576
3.1. Indicators Describing the Study Programme 576
3.2. The Content of Studies and Implementation Thereof 585
3.3. Resources and Provision of the Study Programme 600
3.4. Teaching Staff 609
Annexes 620
Architecture (43581) 621
Study programme 624
3.1. Indicators Describing the Study Programme 624
3.2. The Content of Studies and Implementation Thereof 627
3.3. Resources and Provision of the Study Programme 633
3.4. Teaching Staff 635
Annexes 642
Innovative road and bridge engineering (45582) 643
Study programme 645
3.1. Indicators Describing the Study Programme 645
3.2. The Content of Studies and Implementation Thereof 655
3.3. Resources and Provision of the Study Programme 664
3.4. Teaching Staff 669
Annexes 677
Civil Engineering (43582) 678
Study programme 680
3.1. Indicators Describing the Study Programme 680
3.2. The Content of Studies and Implementation Thereof 684

3.3. Resources and Provision of the Study Programme 690
3.4. Teaching Staff 695
Annexes 704

1. Information on the Higher Education Institution/College

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

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 number of study programmes in October 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	15
Physics, Materials Science, Mathematics and Statistics	9
Internal Security and Civil Defence	6
Information Technology, Computer Engineering, Electronics, Telecommunications, Computer Control and Computer Science	38
Chemistry, Chemical Technology and Biotechnology	10
Mechanics and Metalworking, Thermal Energy, Thermal Engineering and Mechanical Engineering	27
Production and Processing	6
Translation	2
Management, Administration, Real Estate Management	21
Environment Protection	6
Total:	**163**

* 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 academic year 2019/2020, there were by 25% more foreign students studying at RTU in comparison with 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 14 Doctoral study programmes, moreover, this list is updated from year to year.

Dynamics of the number of students in the RTU during the evaluation period:

Academic year	Total number of students
2013./2014.	14,452
2014./2015.	14,797
2015./2016.	14,997
2016./2017.	14,672
2017./2018.	14,322
2018./2019.	14,383
2019./2020.	14,006
2020./2021.	13,237*

* In October 2021, provisionally, 13,237 students are studying at RTU. Provisionally, 9,791 studying in undergraduate study programmes, 2,951 studying in graduate Master degree programmes and 495 in 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 structure of the higher education institution/ college, the main institutions involved in the decision-making process, their composition (percentage depending on the position, for instance, the academic staff, administrative staff members, students), and the powers of these institutions.

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. Description of 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 2.1.1.

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 (The English translation is in the file of Appendix 03 of List 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 2(1) of the Law on Higher Education Institutions by providing a justification for the given statement. In addition, it is also possible to refer to the respective chapter of the Self-Assessment Report, where the provided information serves as justification.

1.	The higher education institution/ college has established a policy and procedures for assuring the quality of higher education.	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.	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.	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 "Regulation 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.	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.	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 by the resolution of RTU Vice-Rector for Academic Affairs No 02000-1.1-e/8 as of 1 February 2021of 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 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 is 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 are 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 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 field whilst implementing their quality assurance systems.	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 2603 December April 20212, Minutes No 594649). 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.

2.1. Management of the Study Field

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

The goal of implementation of the study direction and study programs comprised therein is to provide comprehensively trained professionals in the field of architecture and civil engineering for the Latvian national economy, for working at public and private sector institutions of various levels, by promoting their inclusion on the labour market in compliance with the nationally developed standards of professions, as well as encouraging engagement in business operations, thus actively participating in creation and maintenance of new jobs. The goals of the study direction are clearly defined and attainable, the study direction and the relevant study programs conform with the strategic development directions of the university, the needs of the public and the national economy and development trends. The management structure of the study direction and relevant study programs is targeted at the development of the study direction, the decision making is efficient, the support provided by the administrative and technical staff provides for all the needs of the study programs conforming to the study direction.

Being aware of the role of RTU in developing the future of Latvia and growth of the Baltic Sea region, development of the study programs to be implemented within the scope of the study direction has followed the European Union priorities, as well as the guidelines of the directives applicable to the industry and national and regional education and innovation policy planning documents.

Information about the status of the labour market in the relevant industries and a load of professionals, as well as forecasts of employers regarding future development perspectives, is collected regularly and updated periodically for the purpose of planning the development of the study direction. Short-term plans within the study direction provide for the promotion of mutual coordination of the study programs implemented within the study direction by emphasising the focus on the result to be attained by a joint operation - creation of high quality living space for the public. Long-term plans of the study direction provide for working on the development of joint multilateral study programs and modules.

The study direction supports the vision defined by the Strategy of Riga Technical University (RTU) 2021 -2025: *”High quality and efficiency – proactive linking of the operation of RTU with the needs of the national economy. RTU is among the leading science and technology universities of the Baltic and Northern region, whose operation is based on the study system based on research, innovation and cooperation with the industry. RTU trains engineers of the European and global level - leaders: developers of new technologies”* (https://www.rtu.lv/en/university/strategy) implementation in life.

The study direction “Architecture and Civil Engineering” comprises academic and professional study programs offering acquisition of theoretical and practical knowledge of the field to the future professionals of the civil engineering industry in the fields of architecture, civil engineering, geodesy and mapmaking, transport structures, as well as heat, gas and water technologies.

Highly qualified professionals, namely, architects and civil engineers, of the professions subject to the national regulation are trained in the majority of the professional study programs implemented within the study direction.

Professionals educated within the scope of the study direction “Architecture and Civil Engineering” involve in processes aimed at improving, maintaining and transforming the quality of the living space of the society, and implementation of the study programs comprised therein is based on complex knowledge and understanding of the interaction of technical, social and economic factors in creating a sustainable environment. These principles conform to the long-term interests of the Republic of Latvia and RTU strategy guidelines.

The study direction and the **18** study programs comprised by it conform with the strategic development directions of the university, the needs of the public and the national economy and development trends. All the programs include the requirements of the Latvian and the European Union legislation.

The study direction comprises **one** first-level professional study program, **two** academic Bachelor study programs and **five** professional Bachelor study programs, **two** Master academic study programs, **five** Master professional study programs and **three** Doctoral programs. See the links between the programs in Table 1.1.

Table 1.1.

Interconnection of study programs in the study direction "Architecture and Civil Engineering"							
	Architecture	Civil Engineering	Geomatics	Transportation Engineering	Heat, Gas and Water Technology	Engineering economics and management	Joint study programme
Doctoral study programme	Architecture	Civil Engineering Heat, Gas and Water Technology					
Academic master study programme							Innovative Road and Bridge Engineering Innovative solutions in geomatics
Professional master study programme	Architecture	Civil Engineering	Geomatics	Transportation Engineering	Heat, Gas and Water Technology		
Professional bachelor study programme		Civil Engineering	Geomatics	Transportation Engineering	Heat, Gas and Water Technology	Engineering of Regional Development and Urban Economics	
First level professional higher education study		Civil Engineering					
Academic bachelor study programme	Architecture	Civil Engineering					

As it can be seen in the Table, there are mainly both horizontal and vertical mutual links among programs, in particular, they can be completed gradually starting from the lowest level up to the highest one, or the next education level may be selected from among adjacent programs of sub-directions. This approach provides opportunities for choice and acquisition of broader knowledge, skills and competencies within several specialities.

During the report period, 1 new study program has been established, namely, the Bachelor academic program “Civil Engineering” intended for increasing the mobility of foreign students and developed according to the standards defined for academic level programs in Europe and Latvia.

Implementation of the study direction “Architecture and Civil Engineering” and the study programs comprised therein is aimed at providing architecture and civil engineering professionals possessing comprehensive knowledge for the Latvian national economy to be employed at various public and private institutions, by promoting their integration on the labour market. The study programs conform with the nationally developed profession standards and encourage graduates to start their business operations by actively participating in creating and maintaining new jobs. Development of

the study programs to be implemented within the scope of the study direction has followed the European Union priorities, as well as the guidelines of the directives applicable to the industry and national and regional education and innovation policy planning documents. On 2 October 2017 joined the prestigious association “University Industry Innovation Network (UIIN)”. Coordination of the content of study programs is encouraged within the study direction by emphasising the focus on the result to be attained by joint operation - the creation of high-quality living space for the public.

The economic and social substantiation of the study programs is based on performed industry surveys, which are regularly performed on annual basis by the Ministry of Economics, and it is aimed at following up the development trends of the architecture and civil engineering field, including fluctuations in the increase of the construction and the indices of increase of the construction costs, in order to identify factors hindering the development of the industry and eventual overheating risks in a timely manner, as well as forecasting the production scope and costs in the next years by applying forecasting methods. The survey reveals that during the whole period from 2020 to 2024 the experts and combined forecasts predict a further increase of the industry costs. During the period from 2020 to 2022 this increase could be estimated within the range of 1% to 5% per year, and in 2024 it could achieve 6%. According to the forecast, the biggest increase of costs relates to labour costs where the combined forecast predicts a general increase of 8% to 10% per year over the period from 2020 to 2024. As regards sub-fields, in 2020 a decrease of the industry costs is predicted in the construction of residential and non-residential buildings, as well as in the construction of roads and highways. The most rapid increase is predicted in the construction of bridges and tunnels. An increase of costs in all the sub-fields is forecasted as from 2022 by the construction of bridges and tunnels leading with an annual increase of 5-7%.

The industry researchers have concluded that also defects and deficiencies in construction design documents and insufficient scope of preliminary studies present risks of increase of prices on the level of individual sites in the industry of architecture and civil engineering. In order to mitigate this risk, it is important to implement the building information modelling (BIM) system in Latvia as soon as possible, as it can considerably improve the quality of construction design documents, contribute to the predictability of construction, optimise the organisation of construction works and their sequential performance, reduce construction terms and improve the efficiency of project management and supervision.

The architecture and civil engineering industry has experienced very fast development as of 2017. Its growth amounted to 19.4% in 2017 and to 21.9% in 2018; construction volumes increased in all the core groups of construction during the last year. Both availability of the EU funding and private investment encourage industry growth. The attraction of employees in the industry has restarted since 2018, the number of employees was 74.6 thousand last year accounting for a 30% increase compared to 2010, however, the pace of the growth was lagging behind that of the production growth. The wages of employees have increased considerably in the industry during the last two years and last year they amounted to 94.6% of the mean wage in the national economy.

The study direction "Architecture and Civil Engineering” combines **architecture and civil engineering** programs, which have been developed to ensure mutual integration of study programs of various levels, the linked approach and sustainability within the study direction as a whole. See the links of the programs of the study direction in the table.

There are 3 study programs within the sub-direction “**Architecture**”, the academic Bachelor, Master and Doctoral program. The Bachelor and Master programs jointly provide designing skills and other theory and practical knowledge in related industries to students. The majority of graduates of the study direction work in regulated fields in the Republic of Latvia where the

independent practice certificate can only be obtained by the persons possessing the professional Master level education.

The architect's education has been provided by RTU since 1869 and it has undergone substantial development and improvement, at the same time maintaining the local tradition and character, which can be observed best in the constructed environment. In Latvia, the architect's education can also be acquired at the Business, Art and Technology University RISEBA in the Bachelor and Master study programs, and the education of the landscape architect is offered by the University of Agriculture of Latvia. In comparison to the architecture study programs of universities of other European countries, the architect's education at RTU is characterised by long-standing tradition and high quality, by ensuring the succession of knowledge and experience, which is based on the balanced academic environment and staff to a large extent. In the Bachelor programme students acquire the basic knowledge of architecture in Latvian. In comparison to other architecture study programs available in Latvia and abroad, the academic staff of the architecture program at RTU provide the set of theory and practical knowledge which is recognised in Europe and most appropriate for the Latvian situation.

Within the study direction "Architecture and Civil Engineering", "**Civil Engineering**" is one of the major sub-directions. Within this sub-direction, there are 5 study programs: the 1st level professional (college) study program, the academic Bachelor study program, the professional Bachelor study program, the professional Master study program and the Doctoral study program. High-level construction professionals are highly demanded in the labour market and this is evidenced by both the statistics data about employment and the wage increase in the industry as a whole, as well as performed research confirming that these numbers could just grow in the next years. This leads to the conclusion that there will be an even higher demand for the study programs than until now, which evidences that the industry is developing and is attractive for young professionals.

The study programs "**Civil Engineering**" has been following the industry development during recent years, new unique study courses about the construction information modelling, which is the future for the industry as a whole, have been introduced. At the same time, it is taken into account that more practical knowledge should be acquired in study courses, thus providing a better understanding of construction works. The programs are unique, as new laboratories and new technological machinery not available anywhere else in Latvia is available during studies. The academic staff actively participates in both research and industry development, providing an opportunity for students to start immediate employment after acquiring professional experience or continue studies in study programs of a higher level after acquiring the research direction and participate in the industry research development as young researchers. As regards similar study programs to the study programs "Civil Engineering" in Latvia, there are study programs "Civil Engineering" implemented in the University of Agriculture of Latvia, as well as similar study programs can be found at universities abroad, for instance, at the Technical University of Denmark (Copenhagen, Denmark), Technical University of Vilnius (Lithuania), Technical University of Prague (Czech Republic), University of Glasgow (United Kingdom), etc. Still, the BIF programs are different due to the study course Internship, where students acquire practical work skills, as well as special practical and laboratory study courses, as well as the broad range of research directions and possibilities, which all lead to the conclusion that study programs are sustainable, encouraging development, demanded, modern, attractive and interesting for young students. See Section II for more details about each of the study programs.

Within the study direction "Architecture and Civil Engineering", "**Geomatics**" is another sub-direction. In this sub-direction, there are 2 study programs - the professional Bachelor study program and the professional Master study program. Following the Master level studies, students

can continue studies in the Doctoral study program “Civil Engineering”, which also comprises the direction Geodesy and Geoinformatics. Bachelor in Geomatics with the professional engineer qualification and the Master in Geomatics with the professional engineer qualification are the only professions of this type training professionals in Latvia. The core focus is on geodesy, map-making and land survey, which is all merged in the program Geomatics. Graduates who are survey professionals are demanded on the labour market not only in civil engineering or construction sites but also in a survey of properties, defining borders, detailed definition of the topographic surface or obtaining of other three-dimensional (3D) data. They understand the matters of map-making, can produce accurate maps of a large and small scale, perform decoding of maps, generalisation and other cartographic works. As regards the land survey matters, there are some similarities with the Faculty of Environment and Civil Engineering Sciences (VBF) of the University of Agriculture of Latvia, however, in practice, there is nothing similar to the RTU study programs in academic study programs in the University of Latvia, for instance, in the Faculty of Land Sciences and Geography, where seemingly similar terms and courses can be seen, but the content is totally different. Graduates of the RTU study program can obtain certificates for geodesy works, land survey or cadastral survey works. Besides numerous private companies, among the biggest employers there is the State Land Service (VZD), the Rural Support Service (LAD), the Geospatial Information Agency of Latvia (LGIA), the Maritime Administration of Latvia and the local governments in Latvia.

In the study direction “Architecture and Civil Engineering” there is a separate sub-direction “**Regional Development and Urban Economics Engineering”**. In this sub-direction, there is 1 study program - the professional Bachelor study program. Following the studies, graduates can continue studies in the Master program in both BIF and EVIF Master studies. The study program is unique and no other university in Latvia offers a similar program. The main unique differences of the program are based on its interdisciplinary nature. Several technical faculties, mainly the Faculty of Architecture and Civil Engineering, as well as the Faculty of Electrical and Environment Engineering are involved in its implementation. This leads to a complex approach to the matters of the development of cities and territories. The program is aimed at training professionals for work in local governments and state institutions related to the development of the regional policy, its implementation, municipal matters, etc. The main focus is on the economic aspects of the development of territories, however, by graduating from this program students acquire also basic knowledge about territorial planning, urban construction, infrastructure development and functioning, as well as matters of solving urban social issues. This cooperation among faculties is considered as one of the strategic development directions of the university, as it clearly improves the quality of studies and allows more efficient utilisation of the university potential. Similar programs from the point of view of the content and duration are implemented also by universities abroad. Such examples include the Bachelor study program “Urban and Regional Planning” at the Technical University of Berlin (Germany) and the Bachelor programs “Urban Planning, Design and Management BSc” and “Urban Studies Bsc” at the Global University of London (United Kingdom).

Within the study direction “Architecture and Civil Engineering” there is the sub-direction “**Heat, Gas and Water Technology”**. In this sub-direction, there are 3 study programs - the professional Bachelor study program, the professional Master study program and the Doctoral studies. The program graduates are offered employment in the profession with one of the highest wage levels on the Latvian labour market. There is a very high demand for the program graduates in the European Economic Area (EEA) and the European Free Trade Association (EFTA) countries. The content of the study programs conforms with the amendments to the Energy Law regarding energy communities, which complies with the more extensive involvement of residents in efficient consumption of energy and energy generation, the expanded role of the local government in developing the heat supply strategy as provided by the National Development Plan of Latvia 2021-2027. The study courses within the study program lay the foundation for the program

graduates to participate in the development of smart cities and the digital transformation of the country. The graduates of the study program Heat, Gas and Water Technology receive certifications in the following fields: water supply and sewage systems, including fire extinguishing systems; heat supply, ventilation and air conditioning systems; distribution and user gas supply systems; transmission gas and oil supply systems; refrigeration systems. The study programs looking at the interaction of energy distribution networks within the energy supply of regions, countries and cities are unique and not available in any other technical university (not only in EEA and EFTA but also in the third countries).

Another sub-direction important for the Latvian national economy is **Transport Engineering**. In this sub-direction, there are 2 study programs - the professional Bachelor study program and the professional Master study program. Following the Master level studies, students can continue studies in the Doctoral study program "Civil Engineering", which also comprises the research classification direction "Road Transportation and Infrastructure". In Latvia there are about 73,000 km of roads and streets, as well as about 2400 road and railway bridges in cities and outside cities, therefore highly qualified experts are needed who can design roads, bridges and other transport constructions, manage construction projects, maintain these constructions in operational order, perform scientific research works and develop new civil engineering theories and methods. The professional Bachelor and the professional Master study program "Transport Engineering" has been implemented for more than 15 years. There are very good employment opportunities for graduates, for instance, in road and bridge construction companies, design and consultation offices, research institutions, construction authorities, local governments, construction supervision authorities and elsewhere both in Latvia and abroad. The content of the professional Master study program provides an interdisciplinary approach and student-focused education by students acquiring in-depth knowledge in the field of engineering of transport constructions. All its graduates are employed in both the public sector, local governments, as well as in the private sector or by engaging in individual business operations, which confirms the competitiveness of study programs. Many graduates work in the state administration or have high ranking positions in various institutions. The professional Bachelor study program and the professional Master study program are the only ones in Latvia providing training for professional Bachelor degree holders and civil engineers and professional Master degree holders in transport constructions.

The most unique study programs of this direction are 2 joint Engineering Master study programs with Vilnius Gediminas Technical University (Vilnius TECH, Lithuania) – "**Innovative Road and Bridge Engineering"** and "**Innovative geomatics solutions"**. The academic Master study programs are unique in Latvia; neither are there analogue programs in the education space of the European Union (EU), there is just a handful of similar programs and the competitiveness of graduates of these programs is very high. Further studies can be done both at RTU and Vilnius TECH, students can also join research teams in both universities, which provides an opportunity to acquire much higher-level skills and competencies. This also allows students to compete in the whole of Europe at a much more professional level. These programs should be evaluated as highly competitive and with a high quality of the attainable outcome. No programs under a similar title are implemented by universities of the Baltic countries. Different from other study programs, the goal of this study program is to provide competitive Master degree higher education conforming to international standards and to prepare students for practical work, develop the skills of scientific research work and promote their application both in Latvia, Lithuania and elsewhere in the world. All its graduates are employed in both the public sector, in universities and in the construction industry, which confirms the competitiveness of study programs. Students from Latvia, Lithuania, Egypt, Nepal, Spain and Ukraine are either studying in the program or have completed it.

See Section III for more details about each of the study programs.

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

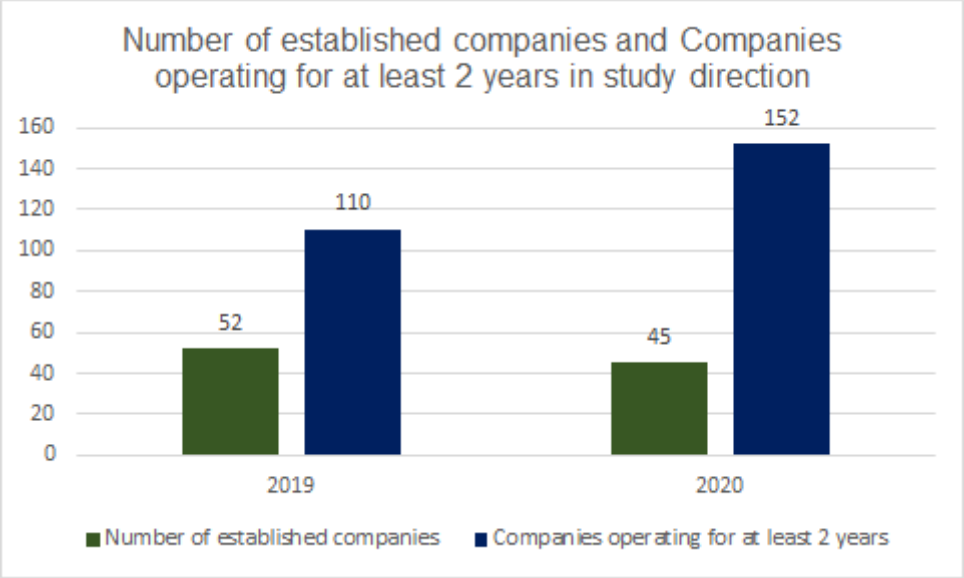
RTU has established a system and developed and implemented procedures for admission of students, evaluation of the study period, professional experience, previously acquired formal and non-formal education and students' achievements and study outcomes, they are logical and efficient.

Analysis of strengths and weaknesses, opportunities and threats of the study direction:

- **STRENGTHS**

1. Recognition, international reputation of RTU and the high-quality study environment contributes to the attraction of new students to the programs implemented within the study direction;
2. The quality of education acquired within the study direction and the demand for the graduates on the labour market contributes to the stability of the number of students;
3. The qualification of the teaching staff and the publicity of their practical and research work results improves the trust in the quality of studies;
4. The creation of modern and inspiring study environment increase the willingness of students to stay at study workshops and laboratories, encourage group work, thus increasing the share of creativity of independent work within the study process;
5. Highly motivated students and mutual creative competition encourage progress towards attainment of high study outcomes;
6. Developed partnerships with foreign universities serve as the basis for the active participation of students in mobility programs.
7. The teaching staff of the direction encourage engagement in business activity, thus actively participating in the creation and maintenance of new jobs. See Chart 1.3.1.

Chart 1.3.1.



- OPPORTUNITIES

1. Improvement of the existing study programs and development of new specialisation of study programs and study courses by evaluating changes in the industries related to the study direction and based on trends on the labour market and directions of scientific research;
2. Study opportunities abroad within the scope of exchange programs, participation in the mobility programs of academic staff, gaining international experience in projects, etc.;
3. The attraction of additional funding and expansion of international cooperation by participating in national and European programs and projects (the National Research Programs, projects funded by the LCS, Horizon 2020, etc.), as well as the development of applied research and cooperation with undertakings in implementing market-focused research;
4. Expansion of cooperation with foreign universities and international institutions and organisations within the scope of the study direction;
5. Provision of remote studies by using the advantages of the digital infrastructure, for instance, for part-time students or students based in regions, as well as successful involvement of foreign guest teaching staff, including implementation of expanded massive, open online course systems (MOOC);
6. Timely integration of the young and future academic staff in the study process and qualification improvement;
7. Integration of study methods targeted at a resolution of problem situations (in cooperation with undertakings) in the study process;
8. The utilisation of the potential of implementation of joint study courses, the double diploma, joint study programs;
9. Improvement of the public interest and awareness of the industry of architecture and civil engineering, thus encouraging further education processes in the country.

- WEAKNESSES

1. Different levels of the initial background of students (in particular, among local and foreign students), a different understanding of the culture and education process and motivation of students;
2. Insufficient use of mobility opportunities of students and academic staff;
3. It is necessary to level the different background levels of students in some study programs;
4. A low level of knowledge of mathematics and physics in secondary schools does not allow students of the first years to acquire engineering subjects on a sufficient level and serves as

the reason for a high drop-out rate;
5. Intense employment of students in parallel to the full-time study process contributing to the deterioration of the success rate;
6. By combining full-time studies with employment, students cannot participate in the study process to a full extent, this causes problems in achieving the envisaged study outcomes, a decrease of the success rate and threats to failing in completing studies;
7. Experience succession, transfer of the experience of generation and attraction of personnel.

- THREATS

- An increase in competition among universities on the local and international level may cause a decrease in the number of students at RTU and their outflow to other universities;
- Insufficient state funding and allocation of funds among study directions, reduction of study places funded from the state budget;
- Effect of the travel restrictions caused by COVID-19 upon the number of foreign students, mobility of the teaching staff and students;
- The outflow of qualified young teaching staff to the industry.

See the development plan of the study direction in the Annex.

The Development Plan is developed in accordance with the RTU strategy, which is aligned with the goals of national and international development plans, such as the ANO Sustainable Development Goals. The development plan of the study field incorporates the guiding principles of the strategies of all three faculties, including the objectives of the New European Bauhaus and the principles of building a high quality European Building Culture.

The Development Plan is developed in accordance with the guidelines of international educational and professional organisations (AECEF and EUCEET; EAAE and ACE) and is aligned with the professional associations of the Latvian sectors (Latvian Association of Civil Engineers, Latvian Association of Architects, Latvian Society of Surveyors, LSGŪTIS, Association of Transport Construction Engineers, Latvian Association of Structural Designers, Latvian Builders Association, etc.). Consultations with educational institutions and student representatives are taking place during the development process.

To **prevent weaknesses** issues of relevance to students and staff are addressed in the direction of study as a whole and in each study programme separately, according to the topicality and the objectives set. Regular exchanges of experience take place. For example, by clarifying the defined minimum requirements for entry to the programmes of the direction of study, as well as by setting up the School of Engineering. The RTU Office of the Vice-Rector for Development carries out regular activities to address gaps in the research and study process.

RTU's competitiveness in Latvia and beyond is being enhanced to avoid the **identified threats**. In order to avoid a decrease in the number of students, the study programme is regularly (at least once a semester) optimised, as well as study courses are updated and improved with the latest developments in the global and local industry. Involvement of young faculty members in international academic and research projects.

To take advantage of the opportunities identified All activities of the study direction are organised to strengthen the reputation of the study programmes and to build cooperation with organisations and universities in other countries. The involvement of students and staff in mobility projects, as well as the development of new cooperation contacts, provides opportunities for new research projects and exchanges of experience.

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

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. Technical support of the study direction 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 of the study direction and the corresponding study programs is ensured by the faculty councils, the direction commission, the director of the study direction and its deputy, as well as the directors of each study program, management and administration of study program implementation institutes and departments and student self-government.

The study direction “Architecture and Civil Engineering” is implemented by 3 structural units - the Faculty of Architecture (AF), the Faculty of Civil Engineering (BIF) and the Faculty of Engineering Economics and Management (IEVF). Joint programs are implemented together with Vilnius Gediminas Technical University. The study direction has 18 study programs in total and they are led by 7 study program directors. The study direction programs are implemented in cooperation with AF and BIF institutes and departments:

- Institute of Transport Structures;
- Institute of Structural Engineering;
- Institute of Heat, Gas and Water Technologies;
- Institute of Building Production;
- Institute of Materials and Structures;
- Urban planning center

Each of the institutes implements one or more study programs included in the study direction or the academic staff representing the institute is involved in their implementation. Institutes and their departments provide teaching and methodological work: create and update study course programs, ensure the teaching of appropriate study courses, supervise and defend graduation works, and perform other activities related to teaching, methodological and scientific work. The teaching staff and technical staff of the study direction also cooperate with other structural units of RTU, such as the Department of Engineering Mathematics, the Institute of Technical Physics, the Department of Labor and Civil Protection, the Department of Innovation and Business Management, the Department of Social Sciences, the Department of Special Use Languages, etc.

In order to ensure the quality of the study programs in the study direction and the necessary support for the teaching staff and students, all structural units implementing the direction (AF, BIF and IEVF) have professional teams, as well as study program self-evaluation working groups.

The working groups include all program directors and the administrative and technical staff involved in the implementation of each study program. This staff performs study support processes - organization of study work, provision of public and international relations, record keeping on students, technical support in study programs and other processes related to the implementation of study programs. The study programs implemented within the study direction fully correspond to the four main goals of higher education - the development of personality, democratic society and science, and the satisfaction of the requirements of the labor market. To ensure this compliance and to implement an effective direction management and development strategy, it is based on the following principles:

- Cooperation - all parties are involved in solving the development issues of the direction: academic staff, students, employers, local governments and state institutions, public organizations.
- Consistency - provision of cooperation and partnership approach in solving the development issues of the direction both within RTU and in cooperation with other institutions.
- Succession - continuous implementation of study and personality development goals, ensuring logical succession in study programs and lifelong learning.
- Sustainability - soundness of educational decisions and balanced development.
- Availability - all students have equal opportunities to obtain appropriate education within the study field.
- Coordination - an integrated approach to change planning and implementation is implemented, ensuring unified management and coordination of change both between different structural units and levels and types of study programs.

In the period, 12 meetings of the study field branch commission have taken place in the study

direction “Architecture and Civil Engineering”.

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.

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The structure of the study direction management is given in the appendix.

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

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) No 632) (available at https://international.rtu.lv/wp-content/uploads/sites/65/2021/02/09.-Procedure_for_Recognition_of_Competencies_Developed_Outside_Formal_Education.pdfis and in the file of Appendix 09. of the list of Internal regulations).

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

During the reporting period, the study direction "Architecture and Civil Engineering" has reviewed 12 applications regarding recognition of the study outcomes achieved in prior education or professional experience and equalisation of prior formal and non-formal education.

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

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 (https://www.rtu.lv/writable/public_files/RTU_studiju_rezultatu_vertesanas_nolikums.pdf (in Latvian); the English translation is in the file of Appendix 04 of the 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.)

2.1.6. Description and assessment of the academic integrity principles, the mechanisms for compliance with these principles, and the way in which the stakeholders are informed. Specify the plagiarism detection tools used by providing examples of the use of these tools and mechanisms.

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 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.

2.2. Efficiency of the Internal Quality Assurance System

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

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 the 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 the 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 the 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 the 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. The 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 into RTU Quality System.

The application of the 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, the 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 the achievement of performance indicators of the annual aims and tasks

set in RTU Strategy. For example, the 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 the 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.

In addition, see the description of each study programme.

In order to ensure the improvement of the study programmes, each member of the academic staff regularly reviews the course evaluation and makes suggestions for the improvement of the study courses and their integration with other study courses and current developments in the field in order to achieve the objectives of the programme. The programme directors regularly analyse the results of the alumni survey and make suggestions for development.

Departmental meetings analyse the relevance of the study process to the indicators to be achieved and consider suggestions from students. Study programmes are developed in line with the ANO Sustainable Development Goals by inviting the most appropriate guest lecturers and by linking course assignments to current developments in the industry.

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

Study programme development and revision processes are regulated according to the "Procedure for Application, Elaboration and Amendment of the Study Programmes" (published at RTU_studiju_reglaments_4.6._programmu_izstradasanas_kartiba.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 26 April 2021, Minutes No 649; published at RTU_studiju_reglaments_4.7._studiju_virziena_komisijas_nolikums.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.

The Study Programme Committee regularly (at least once a semester, 12 meetings in the reporting period) reviews the study programmes and objectives in order to plan changes for future study periods. In order to optimise resources and increase the quality of the study process, the review of the Study Programme may be initiated by students, teaching staff, the management of the faculty and the field of study, as well as by graduates and employers.

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

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 and reply (if the applicant has provided contact details) of applications and summary of application statistics.

Under the new arrangements, a total of 295complaints/proposals have been received between August 2019 and September 2021, 28 of which have been submitted anonymously. Of the submissions 251 were complaints and problems and 27 were suggestions across nine topics (subject: the number of complaints or problems / the number of proposals received):

- Study process: 98 / 17
- Sports: 4 / 2
- IT issues: 18 / 6
- Maintenance of infrastructure issues: 7 / 3

- Accommodation related: 75 / 1
- Scholarships: 9 / 4
- Foreign students' questions: 16 / 4
- Library: 2 / 0
- Other: 22 / 7

Evaluating the submitted complaints on the issues of the study process, 18 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, as well as to develop additional materials in the e-environment in order to better learn study courses, especially through distance learning. There are several complaints about the work of specific lecturers and the procedure of questionnaires about study courses, as well as about the non-observance of the procedure for organizing internships. There have been complaints about difficulties in arranging laboratory work when studies were held remotely, as well as about the timely transmission of information when it is necessary to connect to remote lectures. The new students have suggestions for timely information on practical matters related to university life, and now, during COVID, suggestions for organizing the study process so that everyone can participate.

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 as well as uncertainties about the procedure for allocating places.

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. There is also confusion about the presentation of lecture schedules and joining ORTUS portal. Several uncertainties about RTU e-mail operation and connection.

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

The problem was reported regarding the availability of the library's electronic systems and several uncertainties regarding the submission of scholarship applications, as well as about the procedure for announcing the results.

It has been proposed by foreign students to provide additional Latvian language training. Complaints have also arisen about the recovery of the deposit and confusion about the degree titles. There have also been complaints about communication with clerks, as answers are not always received, as well as several comments about the presentation of the lecture schedule on the ORTUS portal and the quality of remote lectures. Complaints and problems are related to the acquisition of specific study courses and various issues related to the study process and the possibility to receive a scholarship.

Other complain were about alleged harassment, as well as threats from other students 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.

RTU has appropriate procedures for resolving student complaints. The process of reviewing

complaints takes place through the Director of the program and the Head of the department, if necessary - the Head of the Study Department or even the Vice-Rector for Studies. There was only one precedent in the professional bachelor's study program “Civil Engineering” during the reporting period, when students submitted an application regarding the incompetence of the teaching staff of the study course to the program director, solving the problem in a timely manner. The Director of the program found out the reasons and participated in the relevant lectures, as it was concluded that the students' complaint was legitimate, the lecturer was changed by choosing another lecturer whose competence corresponded to the specific study course. However, it should be noted, that the respective study course was an optional course and was not performing by a lecturer of the Faculty of Civil Engineering.

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

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 processes "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 per cent 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 by 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 the 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 the 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 a scientific degree, the ratio of graduates to the number of matriculated students, number of students who continue studies (not exmatriculated), the 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 the collection of statistical data necessary for evaluation of the study programme performance and data visualization within the framework of the 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).
- The number of students, who reside in student hostels (Study Organization Unit).
- The 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).
- The number of mobility students in the total number of students (University Review at the Beginning of the Academic Year).

- The 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.

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 by the resolution of RTU Vice-Rector for Academic Affairs No 02000-1.1-e/8 as of 1 February 2021; 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 study 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.

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

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);
5. E-platform (responsible person – G. Alksnis, Head of the Program Management and Curriculum Design Unit)
6. State Education Information System (responsible person – I. Pujats, Project Manager of the Information Technology Department).
7. RTU web page section about information on education opportunities and latest news in Faculty of Civil Engineering (Būvniecības inženierzinātņu fakultāte | Sākums (rtu.lv)) (responsible persons – J. Mačāns (Counselor of career) and S. Krasta (Manager of Database)).
8. The section on studies and news at the Faculty of Architecture on the RTU website https://www.rtu.lv/lv/af (person in charge: Evita Serjogina).

Information on the study programs of the study direction published on the RTU website corresponds to the information available from official registers, provides important information for applicants and students, it is published in all the language of implementation of the study program.

2.3. Resources and Provision of the Study Field

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

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:

$Fs = Tb \times [S(ki \times ni) + 1,5 \times S(ki \times mi)] + Sb \times S(ni + mi)$, 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 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
Architecture and urban planning	3.5
Aviation transport	4.2
Construction	2.9
Civil engineering and real estate management	1.71
Civil and occupational safety	2.9
Civil defence	4.2
Computing	2.9
Computer training	2.42
Economics	1.4
Electronics and telecommunications	2.9
Power and electrical engineering	2.9
Physics	3.2
Geodetics and cartography, geomatics	2.9
Innovation	2.9
Engineering drawing	2.9
Quality management	2.9
Chemistry and chemical technology	3.2
Applied arts and design	3.5
Mathematics and statistics	2.42
Material sciences	3.2
Mechanics, mechanical engineering, construction of machines and mechanisms	2.9

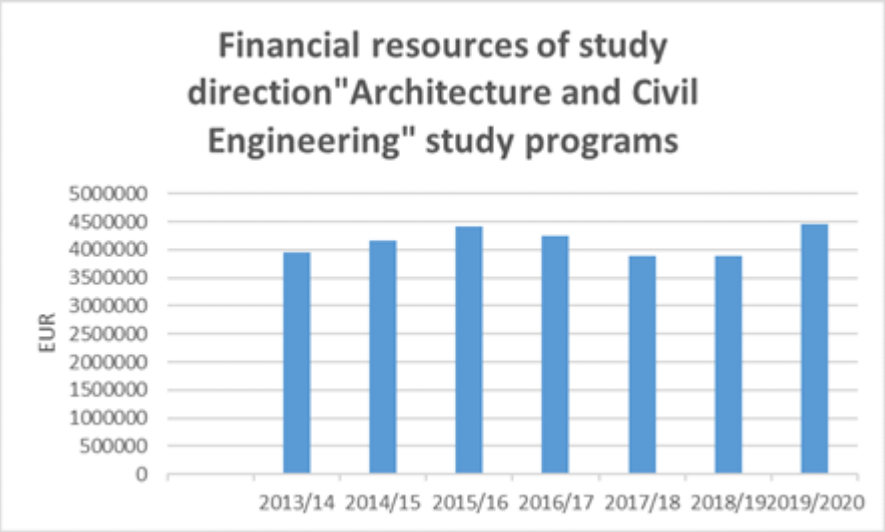
Internal security and customs	4.2
Pedagogy	1.67
Heat engineering, heat, gas and water technology	2.9
Social sciences	1.4
Sports	2.0
Law	1.4
Transport	2.9
Management and administration	1.4
Languages	3.2
History and philosophy	1.4
Environmental engineering and management	3.2
Logistics	1.8

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.

Funds for science and art creative measures are granted from the RTU Science Development Fund. For instance, for the international conference “Koka dienas” [Wood Days] (2017– 2019), the workshop of Ph.D students 2018 – 2019, Forum Wood Building Baltic and other events. Implemented events present an opportunity for researchers and students to acquire new knowledge, to share experience and to establish contacts for new research and art creative projects.

The graph below "Financial resources of study direction "Arhitecture and Civil Engeeniering" study programmes”” provides information on financial resources of the study programmes included in the study direction “Arhitecture and Civil Engeeniering” for the period of 2013–2020.



Research base funding (base funding provided by the state) is allocated among faculties according to the performance-based output indicators, i.e., 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 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 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 administration of the externally funded research projects, e.g., within Horizon 2020 program and other. 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 the 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.

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

The construction of the 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, the 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 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 the 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/; in Latvian) 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.

Performance of practical assignments and accessibility of laboratories is important within the study direction "**Architecture and Civil Engineering**". In annex there is the list of the major equipment available for performing scientific research at the Faculty of Civil Engineering.

Technical provision, equipment and its accessibility are very important for the BIF study programs; as it can be seen from the Figures in Annex, there are very extensive possibilities of using equipment, premises and machinery and this contributes to a high-quality study process and excellent research activity. It is the goal to continuously expand the range of equipment and laboratories of this type and to develop them based on state-of-art technologies, there is the continuous process of procurement of equipment and this goal should be viewed as attainable and successfully achieved during the reporting period and in future.

At the Faculty of Architecture in the **Architecture study programs,** the study process takes place in a renovated building providing all the necessary infrastructure as regards premises, equipment and its accessibility, in order to ensure study and research processes. The teaching staff of the

study programs has a sufficient number of working premises providing the possibilities of digitalising and processing documents, and they are also equipped with modern IT equipment. In 2017 the Faculty of Architecture invested EUR 50,000 in technical equipment, including stationary and portable graphic design work stations and GIS work stations, large format printing, pilotless aircraft, urban planning simulation software URBAX etc. A part of the equipment is included in the online database UseScience (https://scientificservices.eu/) for broader access. The teaching staff of the architecture study programs has access to procured software licences at RTU, including MATLAB, IBM SPSS Statistics, ArcGIS, AutoCAD etc. licences, which are provided via HPC (https://hpc.rtu.lv/software/?lang=en).

Students and teaching staff also have access to online databases provided by the RTU library, including SpringerLink, Web of Science, SCOPUS, WILEY, IEEE Xplore, ScienceDirect and others. RTU documents are accessible from the centralised digital ORTUS system (based on Moodle). It also provides modules for teaching staff and research (Project Management System).
Students have access to the methodology room (see more details in Paragraph 3.3.1) and the wood processing workshop of the Institute of Design Technologies on the first floor of the AF building, as well as the creative laboratory RTU Design Factory (DF). During the reporting period, the Faculty of Architecture has procured mechanical tools to collect everything needed for a mobile workshop. The long-term goal provides for the implementation of simulation laboratories (for instance, digital simulation and virtual reality, simulation on scale 1:1).

During the period subject to evaluation, in cooperation with the industry and by using the technical equipment available to the Faculty, an urban garden (see Annex) was constructed at the main entrance to the building, within the scope of the urban gardening research projects, as a test site for various plants, as well as a visual and information tool for the employees and students staying in the building and all visitors to the RTU campus in Ķīpsala.

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

The library plays an important role in the provision of methodological guides and educational resources to students. 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 (https://www.rtu.lv/lv/studijas/biblioteka/pakalpojumi-3 (in Latvian)) or an application form, contacting by phone 67089353, or visiting the Library at 5-105 Paula Valdena Street. 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, http://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 direction “Architecture and Civil Engineering”, 470 new books were purchased by the SL amounting to 39151.71 EUR in the period of 2013 – 2020.

- At the request of the academic staff of the study programme “Architecture ”, 93 new books were purchased by the SL amounting to 4752.07 EUR in the period of 2013 - 2000.
- At the request of the academic staff of the study programme “Building”, 230 new books were purchased by the SL amounting to 18178.03 EUR in the period of 2013 - 2020.
- At the request of the academic staff of the study programmes “Geomatics”, “Innovative solutions in geomatics”, 24 new books were purchased by the SL amounting to 4685.26 EUR in the period of 2013 - 2020.
- At the request of the academic staff of the study programmes “Road and bridge engineering”, “Transport Engineering”, 34 new books were purchased by the SL amounting to 5157.82 EUR in the period of 2013 - 2020.
- At the request of the academic staff of the study programme “Heat, gas and water technology”, 37 new books were purchased by the SL amounting to 3110.33 EUR in the period of 2013 – 2020.
- At the request of the academic staff of the study programme “Regional Development and Urban Economics Engineering”, 52 new books were purchased by the SL amounting to 3268.2 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&English)).

Subscribed databases

(https://www.rtu.lv/en/studies/scientific-library/electronic-resources):

- 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.
- Latvian databases: LETA, Letonika, Latvijas standartu datubaze (available only on library premises).

E-resources for the study programme "Architecture":

- **E-books:** Proquest Central, Ebscohost eBook Academic Collection, SpringerLink, MasterFILE Reference eBook Collection.
- **E-journals:** Ebscohost Academic Search Complete, Wiley Online Library, Ebscohost MasterFile Premier, ScienceDirect (Elsevier).

E-resources for the study programme "Building":

- **E-books**: Proquest Central, Ebscohost eBook Academic Collection, SpringerLink, ScienceDirect (Elsevier).
- **E-journals:** Ebscohost Academic Search Complete, Ebscohost Applied Science and Technology Source, ScienceDirect (Elsevier), Wiley Online Library, *Ebscohost Business Source Ultimate,* Ebscohost MasterFile Premier.

E-resources for the study programme "Regional development and urban economics engineering":

- **E-books**: Proquest Central, Ebscohost eBook Academic Collection, SpringerLink.
- **E-journals:** Ebscohost Academic Search Complete, ScienceDirect (Elsevier), Wiley Online Library, *Ebscohost Business Source Ultimate,* Ebscohost MasterFile Premier.

The use of RTU SL databases has been growing since 2016. The number of downloaded full texts in 2020 – 418103.

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 Friday (https://www.rtu.lv/writable/public_files/RTU_2_rtu_library.pdf). There is a 24h 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 24h. During the summer the Central Library is open every working day with reduced opening hours.

The SL information sources are open access resources. Books and periodicals relevant for the study direction "Architecture and Construction" are located in the main building of the SL (5 Paula Valdena Street) in compliance with UDC indexes. The basic indexes for this direction are:

72 – Architecture.

628.1 - Water supply. Sewerage.

692 - Structural parts and elements of buildings and structures.

691.3 - Construction materials.

69:53 - Construction physics.

697 - Heating and ventilation, air conditioning.

69 - Technology of construction processes.

71, 625, 656, 52, 528, 330, 33 etc.

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 (https://www.rtu.lv/lv/studijas/biblioteka/nozaru-informacija (in Latvian)).

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. Searching for the information in the union catalogue, 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.

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

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 the 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 "RTU IT sistēmu saskarnes / 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?english=true – screenshots of the interface are attached in "RTU IT sistēmu saskarnes / 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 the 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 requests for documents (references, transcripts of records, copies of a learning agreement, etc.). For online distance learning, RTU academic staff has options to use *Zoom* or *Microsoft Teams* video conferencing platforms.

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 "RTU IT sistēmu saskarnes / 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 "RTU IT sistēmu saskarnes / 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 of 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 the 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 the Open Access principle (https://science.rtu.lv – screenshots of the interface are attached in "RTU IT sistēmu saskarnes / 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.

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

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); the English translation is in the file of Appendix 42-43 of the list of Internal regulations), 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 Election of a Candidate for the position of Professor or Associate Professor and the Procedure for Assessing the Qualification of an Existing Professor or Associate Professor approved by the RTU Senate meeting on 29 June 2020 (published at https://www.rtu.lv/writable/public_files/RTU_par_profesoru_un_asocieto_profesoru_periodisko_novertesanu_apstiprinasanu.pdf(in Latvian); the English translation is in the file of Appendix 45 of the list of Internal regulations).

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 the 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 (see the file of Annex 44 of the list of Internal regulations), 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 Riga Technical University" as of 27 April 2020 (amendments on 28 September 2020, 21 December 2020, 25 January 2021) (see the file of Annex 44 of the list of Internal regulations).

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 the 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.

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

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 to take into account the professional competence and needs of the academic staff, which are identified through a survey, in which the lecturers indicate the most important topics and areas in which they want to improve themselves. Student 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 competencies 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 the RTU Department of Further Education.

The themes of seminars and classes are offered to take 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 at https://www.rtu.lv/lv/studentuserviss/karjeras-centrs-ssc/projekti-un-seminari/seminari-un-vieslekcijas (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.

In the project SAM 8.2.2. To Strengthen Academic Staff of Higher Education Institutions in the Areas of Strategic Specialisation (01.12.2018 - 31.11.2022), the process of increasing the quality and knowledge of the teaching staff is being implemented. The results of the study direction in March 2021 are summarized in the table:
Table 3.1

	Aim	Achieved
Internship of academic staff in companies	22	9 completed Institute of Heat, Gas and Water Technology, (5) - A.Lešinksis, L. Migla, K.Tihomirova, A. Greķis, A. Borodiņecs Institute of Building Production (3) - M. Vilnītis, K. Ronis, B. Gaujēna Department of Road and Bridges (1) - J. Mačāns
Attracting foreign teaching staff	7	5 agreements concluded (2 more in the process) 1) Institute of Building Production (responsible M. Vilnītis) – 1 Guest Lecturer Krishna Kiran (India). 2) Institute of Heat, Gas and Water Technology (responsible K. Tihomirova) – 1 Guest Lecturer Prof. Nuno (Portugal). 3) Institute of Heat, Gas and Water Technology (responsible A. Borodiņecs) – 1 Guest Lecturer Prof. Primal Fernando (Sri Lanka). 4) Institute of Building Production (responsible M. Vilnītis) – 1 Guest Lecturer Prof. Michaele Guida (Italy). 5) Faculty of Arhitecture (responsible U. Bratuškins) – 1 Guest Lecturer Assistant prof. Toms Kokins (University Umeo, Sweden)
Attracting of students Doctoral study programme	4	3 agreements concluded (1 more in the process) 1) Institute of Heat, Gas and Water Technology – 1 (from December 2019 Renārs Millers) 2) Department of Geomatics - 1 (from August 2020 Katerīna Morozova) 3) Faculty of Architecture – 1 (from May 2021 Alisa Koroļova)

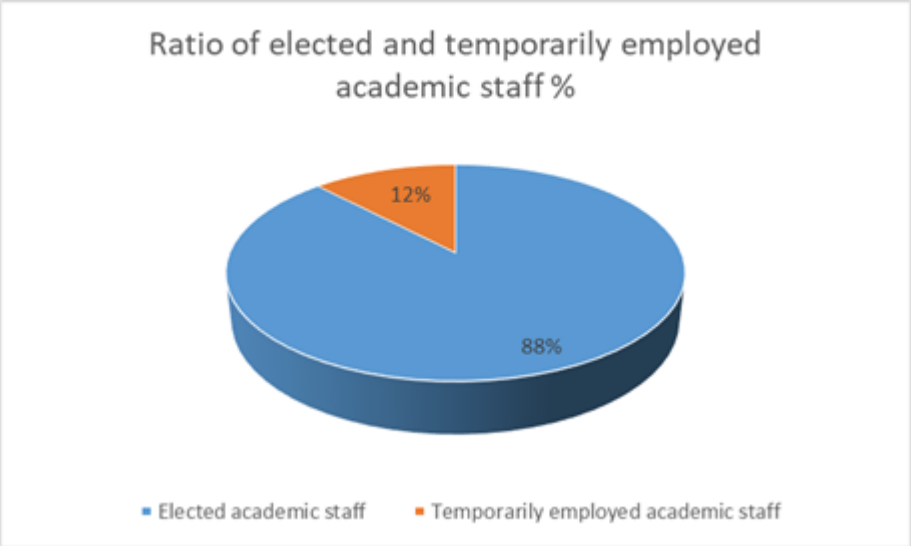
The opportunities for up-skilling used by teaching staff add value to the study process and make a significant contribution to improving the quality of studies. Overall, the contribution made is a long-term process, the evaluation of which takes place in the context of the assessment of the quality of

courses and programmes.

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

In the implementation of the study direction “Architecture and Civil Engineering” totally 181 teaching staff members of RTU who have been elected to academic positions at RTU are involved, in particular, 159 teaching staff members, or employed temporarily - 22 teaching staff members (see Chart 3.7.1). The professional qualification of the academic staff is fully compliant for implementation of the study programs of the study direction, and 110 persons (69.2%) of the RTU elected academic staff hold the Ph.D degree, 48 (30.2%) persons hold the Master degree and 1 person (0.6%) holds the Bachelor degree, and within the staff employed temporarily, 5 persons (22.7%) hold the Ph.D degree and 17 persons (77.3%) hold the Master degree. Expanded information about all the teaching staff members of the study direction is available in the Annex: List of academic staff and CV of the academic staff .

Chart 3.7.1.

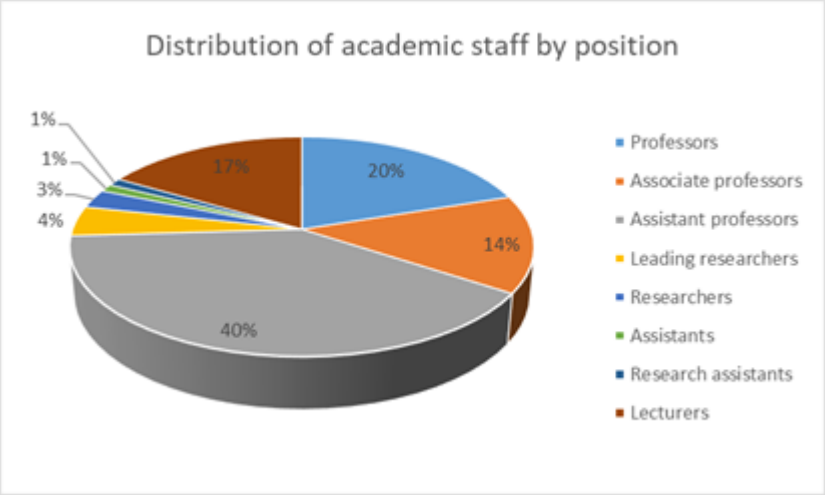


The analysis of data of the elected academic staff at RTU lead to the conclusion that the Ph.D degree has been obtained in the science field corresponding to the delivered course. The majority has acquired the Ph.D degree in science fields and sub-fields corresponding to the study direction “Architecture and Civil Engineering”, however, depending on the delivered course, there are also academic staff members holding the Ph.D degree in economics, engineering, teaching, social sciences, etc. The mean age of the teaching staff of the study direction is around 50 years. Many teaching staff members of the study direction holding the Ph.D degree are experts of the Latvian Council of Science in various science sub-fields, for instance, the Civil Engineering and Transport Engineering, Social Sciences, Humanities and Art Sciences, etc., as well as experts of science and research institutions of the European Union countries. These are very important indices of of provision of the quality, sustainability of the study programs and succession of the teaching staff.

62 (34%) representatives of the academic staff elected to the positions of a professor and an associated professor participate in implementation of studies. 72 (40%) assistant professors, 8 (4%)

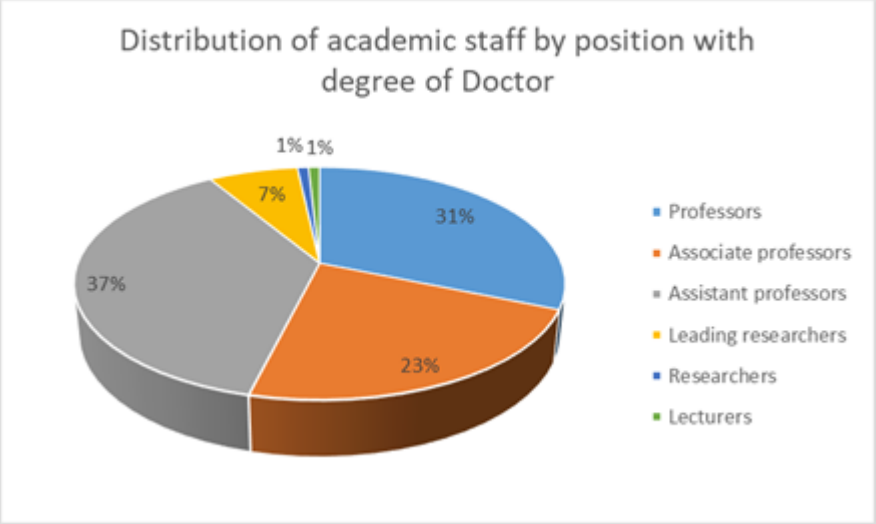
leading researchers, 5 (3%) researchers, 2 (1%) science assistants, 2 (1%) assistants and 30 (17%) lecturers (see Chart 3.7.2).

Chart 3.7.2.



The analysis of the academic staff members holding the Ph.D degree elected for implementation of the studies leads to the conclusion that this group comprises all the 36 elected professors and 26 elected associated professors, as well as all the 8 leading researchers and also 43 assistant professors. 1 researcher and 1 lecturer also hold the Ph.D degree (see Chart 3.7.3).

Chart 3.7.3.



In the course of setting the wage and load for the academic, administrative and research work, the integrated planning principle is applied, taking into account the envisaged work volume for the current study semester or year and making adjustments based on the preceding period.

The academic work includes contact hours in classrooms and laboratories, consultations, advising on and reviewing of study and graduation projects, working in examination commissions, methodological work and activities improving the quality of studies, etc.

The administrative work includes management of study programs and the study direction, work in councils, commissions, the Senate, management of structural units and departments, etc.

The research work includes attraction and management of projects, performance of research assignments paid from the development funds or the third party financing, preparation of

publications, advising on and reviewing of Ph.D Thesis, work with Ph.D students and consultations.

On daily basis the duties of the personnel overlap and all the elected academic staff members have both academic and research load and, in some cases, are also engaged in administrative work. The academic and research load is not strictly separated at RTU, the proportion thereof is set individually for every academic staff member by planning the relevant employee's load in the department and also by taking into account his/ her position, involvement in project implementation, professional competences and experience. Qualification of the academic staff in the study direction is very high, it is particularly important that the majority of the academic staff members holding the Ph.D degree are leading professors and leading researchers of their field with substantial international experience. This is confirmed by the scientific performance of the teaching staff: the mean Hirsch (H) index of the RTU teaching staff involved in the implementation of the study programs of the study direction "Architecture and Civil Engineering" is 4.64.

Involvement of local and foreign guest assistant professors and guest professors in the study process should also be mentioned. This number varies and depends on several factors, like availability of guest professors in the particular study year, schedules of study courses and the need to involve a teaching staff member of a particular specialisation, as well as available funds. Based on the new RTU Development Strategy 2021-2025, the work is being done for creating a stable long-term system for provision of guest professors at RTU to ensure sustainability and quality of the study process.

In addition to the above, high level professionals (guest lecturers) representing the industry, state institutions, non-governmental organisations, etc. are actively integrated in the study process according to the needs and specifics of every study course. The main goal of such involvement of the teaching staff is improvement of the quality of the study content and transfer of current industry trends to the study content. The goal of implementation of the requirement is to provide close cooperation between the academic process and the industry and to minimise the mutual thematic and development isolation. During the reporting period approximately 170 persons were involved in implementation of the study programs of the study direction. It should be added that a large part of guest lecturers are cooperation partners of the RTU scientific research activities and also graduates.

The professionalism and competence of the academic staff involved in the study direction and programs for implementation of high quality study programs is high and is continuously improved. State aid programs for improvement of the quality of study programs play an important role in improvement of study programs and provision of continuous sustainability of study programs. For example, the goal of the project funded by the European Social Fund and implemented by RTU SAM 8.2.2. "Strengthening of Academic Staff of Riga Technical University in Strategic Specialization Areas" is to strengthen the academic staff of RTU in strategic specialisation fields in 10 study directions, including the study direction "Architecture and Civil Engineering", by employing foreign academic staff, Ph.D students and applicants for scientific degrees in RTU.

See attached:

- Table containing the basic information about the academic staff involved in implementation of the study direction
- Curriculum Vitae of the teaching staff.

Statistic data about the incoming and outgoing mobility of the teaching staff during the report period.

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

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; o 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 documents 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 and verifies the compliance of the submitted documents with the requirements specified in regulatory enactments.

RTU ICFSD foreign student admission team organizes introductory or orientation virtual seminars for foreign students, which take place before the beginning of the academic year/semester and students' arrival in Latvia, to inform students about practical issues related to entry and stay in Latvia (entry requirements, vaccination, self-isolation). , accommodation, etc.)

ICFSD in cooperation with the Student Service provides its students with a career counsellor, who explains employment-related issues to students and introduces them to available vacancies, thus facilitating students to gain work experience and develop their skills and abilities.

2.4. Scientific Research and Artistic Creation

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

The number of publications in the reporting period could be indicated as one of the most important indicators of high-quality scientific research in the RTU study direction “Architecture and Civil Engineering”. For example, in the period from 2015 to 2021, a total of 788 teaching staff theses were published in publications cited in the SCOPUS database, of which 55.5% were in Open Access publications. The topics of the publications by areas are given in the graphic below.

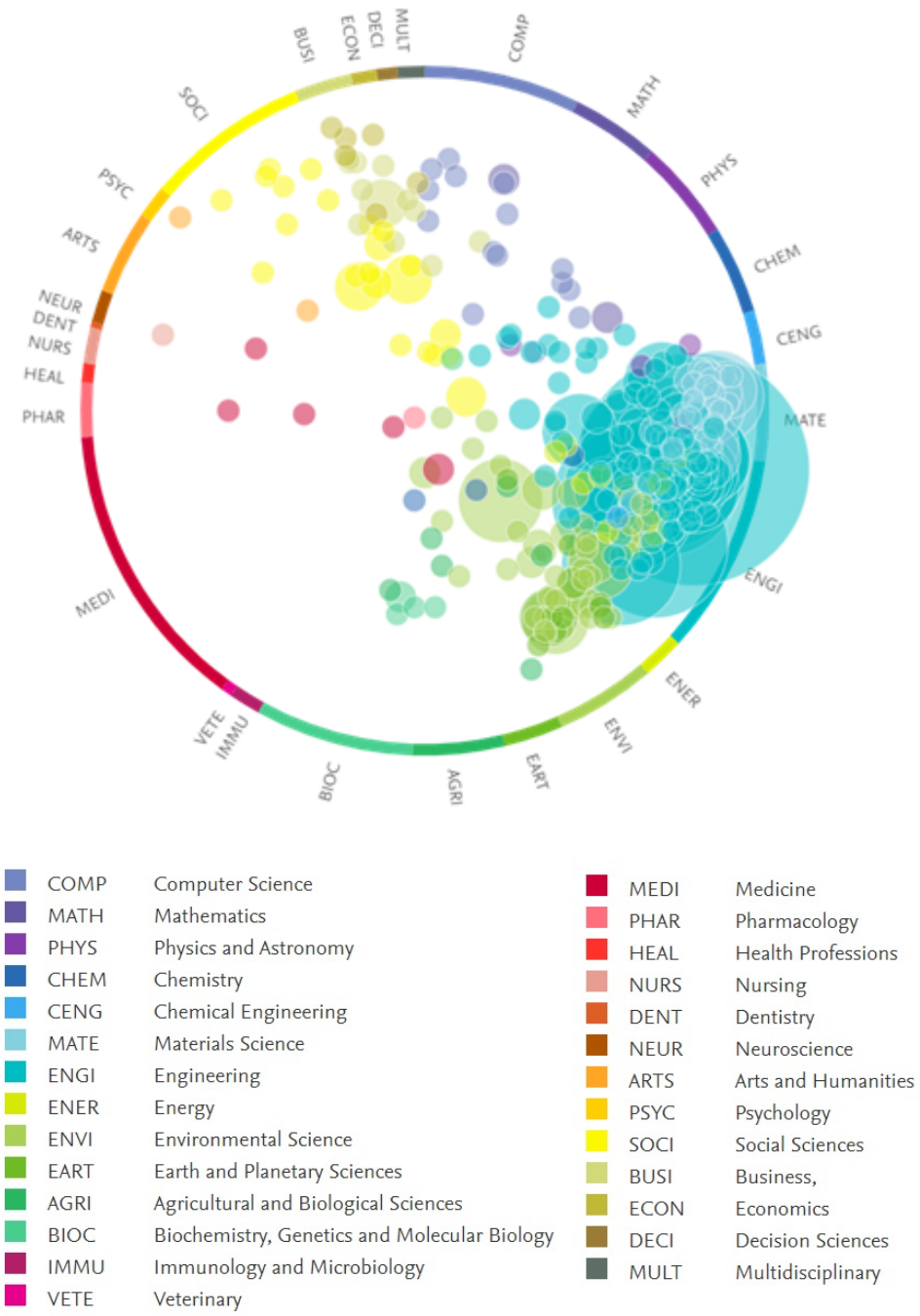


Figure: Contribution of SCOPUS indexed publications (2015-2021; data for 2021) of RTU study direction “Architecture and Civil Engineering” to the development of thematic areas (data from the SciVal tool).

Based on the data of the SciVal tool, the main areas in which the lecturers of the RTU study direction “Architecture and Civil Engineering” published SCOPUS indexed articles in 2015-2021. (788 publications in total) are Engineering (31.9%), Materials Science (21.0%) and Energy (8.5%), In the period from 2015-2021. The publications of the teaching staff of the RTU study field “Architecture and Civil Engineering” contributed to the development of 393 thematic areas (185 thematic clusters). The dynamics of changes in the number of publications by years is given in the figure below:

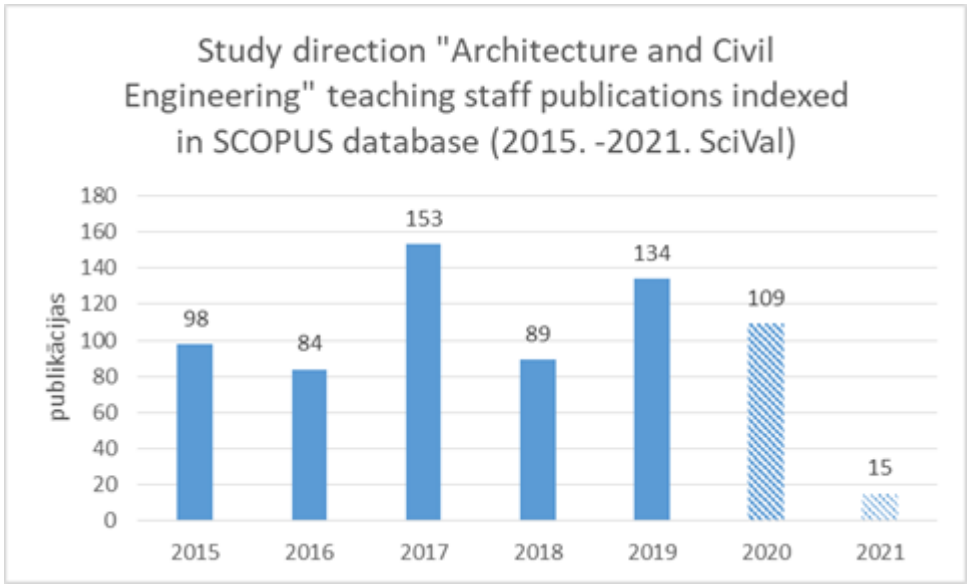


Figure: Number of publications of scientific articles of RTU study direction “Architecture and Construction” (data for 2020 and 2021 are not complete).

In the period from 2015-2021, 788 publications have been cited 3567 times, an average of 4.5 citations per publication.12.7% of publications are among the 10% most cited publications in the world and 8.9% of scientific articles (56 publications) have been published in CiteScore top 10% journals. The dynamics of changes in the average number of citations per article is given in the figure below:

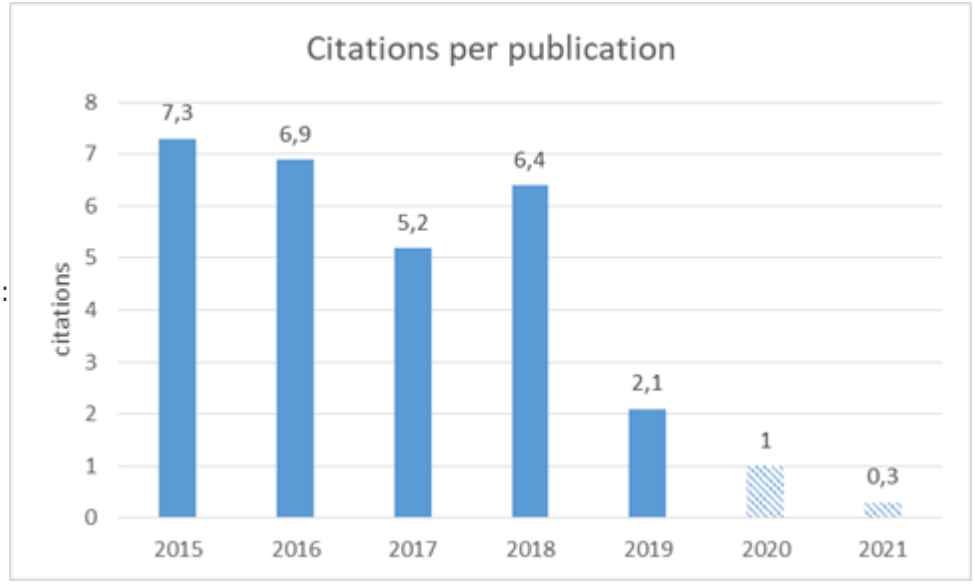


Figure: Dynamics of citations of scientific articles of RTU study direction “Architecture and Civil Engineering” (data for 2020 and 2021 are not complete).

The goals of the Faculty of Civil Engineering and their attainment plan includes successful participation in national and international projects, improvement of the quality of publications, transfer of knowledge and technologies to students and the Latvian economy, as well as development of the research infrastructure.

The main scientific directions defined by FCE are:

Building constructions, their calculation and modelling, design of different structures – Professor, Dr.sc.ing. Dmitrijs Serdjuks, professor, Dr.sc.ing. Leonīds Pakrastiņš, Professor, Dr.sc.ing. Raimonds Ozoliņš, Associate Professor, dr.sc.ing. Līga Gaile, Associate Professor, Dr.sc.ing. Jānis Šliseris, Professor, Dr.sc.ing. Ivars Radiņš.

More detailed list of research fields:

- Development of next-generation composite structures with rational relationship of unladen weight to payload (assoc. prof. Šliseris).
- Performance analysis of Engineered Cementitious Composites (prof. L. Pakrastiņš).
- Prediction of vibrations in building constructions for cases of complex dynamic effect and the systems of their absorption (prof. I. Radiņš, assoc. prof. L. Gaile).
- Rational large span steel structures (prof. D. Serdjuks).
- Graphic communication didactics, computed architectural design, civil and machine engineering (prof. M. Dobelis).

Research in geotechnical construction conditions and construction physics – leading researcher, Dr.sc.ing. Kaspars Bondars, assoc. prof.,Dr.sc.ing. Genādijs Šahmenko, professor, Dr.sc.ing. Mārtiņš Vilnītis.

More detailed list of research fields:

- Development of innovative building construction technologies (prof. M. Vilnītis).
- Building construction technologies and building physics (prof. M. Vilnītis).
- Analysis of construction foundations and research in geotechnical aspects of constructions (lead.res. K. Bondars).
- Research of slope stability issues aiming to use the results in construction of the Latvian roads (lead.res. K. Bondars).
- Quarry slope strengthening during excavation works (lead.res. K. Bondars)
- Technical inspection of buildings (prof. A. Korjakins, assoc. prof. G.Šahmenko).

Composite materials, structures, strength analysis, technical monitoring – professor, Dr.sc.ing. Andris Čate, professor, Dr.sc.ing. Jevgenijs Barkanovs, leading researcher, Dr.sc.ing. Kaspars Kalniņš, professor, Dr.sc.ing. Aleksandrs Korjakins, assist. prof., Dr.sc.ing. Albīns Skudra, professor, Dr.hab.sc.ing. Viktors Mironovs.

More detailed list of research fields:

- Effective application of perforated metal materials in civil construction. (prof. V. Mironovs).
- Application of ferromagnetic powder technology for oil product absorption from water and ground surfaces. (prof. V. Mironovs).
- Recycling of industrial waste and production of building materials (prof. A. Korjakins, prof. D. Bajāre).
- Risk assessment in civil engineering (prof. A. Korjakins).
- Structures and properties of building materials (prof. D. Bajāre).
- Nanoconcretes (prof. A. Korjakins, lead. res. G. Šahmenko).
- Lightweight foam concrete (prof. A. Korjakins, lead. res. G. Šahmenko).
- Finite element method in analysis of laminate and sandwich composite structures (prof. A. Čate, prof. J. Barkanovs).
- Identification of mechanical properties of composite materials and structures (prof. A. Čate, prof. J. Barkanovs).
- Dynamics / vibration damping in composite materials and structures (prof. J. Barkanovs).
- Smart materials and structures (prof. J. Barkanovs).
- Phase changing materials (prof. D. Bajāre, prof. A. Korjakins).
- Environmentally friendly thermal insulation materials (prof. A. Korjakins, prof. D. Bajāre, lead. res. G. Šahmenko).
- High performance composite material technologies (lead. res. K. Kalniņš).
- Strength of thin-walled structures (lead. res. K. Kalniņš).

- Damage detection in composite material structures (prof. A. Čate, lead. res. S. Ručevskis)

Building information modelling – professor, Dr.sc.ing. Modris Dobelis, professor, Dr.sc.ing. Mārtiņš Vilnītis.

More detailed list of research fields:

- Didactics of graphic communication, computed architectural design, civil and machine engineering (BIM) (prof. M. Dobelis).
- Data processing and integration into a building life cycle using BIM (prof.M.Vilnītis).

FCE has highlighted activities that would ensure successful attracting of funding; primary with active participation in research projects (Horizon 2020 projects), undertaking contractual arrangements from companies, state and local authorities, as well as more targeted commercialization of their developments. Project knowledge is directly transmitted into existing FCE study subjects focused on civil engineering, water and gas supply, safety, materials and systems for bachelor, master and PhD programs, thus providing opportunity for students to become high-level specialists FCE.

Following **financial support opportunities for PhD students are provided** for increasing new learning techniques, gaining access to specific data, instruments, methods not available in FCE, boosting staff renewal:

- Study places are financed by the State budget.
- Students in study places financed by the State budget may apply for a grant equivalent to credit.
- RTU doctoral candidates may be eligible for financial support for a conference visit or for the publication of a scientific article in an international scientific journal.
- **“Postdoctoral research support”** - The grant may be used for the remuneration of the doctoral candidate, for the purchase of materials needed for doctoral research and for the costs of publicity.
- **“Practical research”** support attracts scientists, PhD’s and Master’s students for development of innovative solutions solving practical economic problems, including the promotion of cooperation among businesses, research institutions and higher education institutions by providing knowledge transfer in smart specialization areas, taking into account the results of smart specialization monitoring and focusing on projects with high commercialization potential.
- **“Innovation grants for students”** is support for student research and innovation projects for development of new products and technologies, for development of innovative solutions solving practical sectoral or societal challenges.
- **“Short time scientific missions” (STSMs)** – within COST actions which supporting individual mobility, strengthening existing networks and fostering collaboration. The financial contribution for a STSM is a fixed grant based on the applicant’s budget request and the evaluation of the application by the STSM committee.

ERASMUS+ program - is an instrument to promote mobility of PhD students and young researchers (in total 42 persons took part). Students and staff of RTU and partnering universities are provided an opportunity to participate in foreign study, lecturing or experience exchange by the European Commission higher education exchange programs and mobility as part of bilateral contracts realized by RTU.

The research fields of the Faculty of Architecture conform with the trends of modern architecture theory, preservation of the cultural heritage, assessment of the effect of the climate change on sustainable environment planning, links of the urban development strategies with social

processes and visual interpretation of the spatial environment in design, including use of ICT in design and planning. The research activities of AF is an important part of the national culture considering the balance between the modern world development trends and regional tradition in the constructed environment for sustainable living space for the public. As regards the increasing effect of cities to the global economics, the urban environment ranks among the most important research areas asking for more interdisciplinary and locally based approach and cooperation with researchers of other fields.

By following up global sustainable development problems (for instance, expansion and reduction of cities, effect upon ICT, energy efficiency of buildings, preservation of the cultural heritage), AF focuses on the research directions defined by the AF research program:

1. The history of architecture in Latvia and urban planning within the context of the European culture (characteristics of the local architecture in correlation with global trends, for example, use of the traditional local material timber in modern architecture);
2. “Dissonant” heritage in Latvia (the former USSR abandoned military territories, etc.);
3. development perspectives of mass micro districts (large scale micro districts in the cities of Latvia account for a large part of residential space, making the issue of their future perspective an important research issue);
4. Quality of apartment houses in the historical centres of cities (a topical issue due to the extensive historical heritage and the urgent needs to maintain the residential function in city centres, in particular, in the historical centre of Riga);
5. Identity of the urban environment and balanced development (how global development trends can be balanced with the needs of preservation of local heritage by ensuring development of modern cities, at the same time maintaining the local identity);
6. Modern trends in urban gardening (allocated gardens present a traditional component of the Latvian urban environment and their future role in renovation of cities should be evaluated within the context of regional and global processes);

development of cities in territories subject to the flooding risk (irrespective of various threats and regulatory restrictions, people are interested to develop buildings in territories at water bodies imposing the flooding risk, which creates the necessity to develop a research based system for development of such territories).

For the purpose of making the results of scientific activity public, the AF publishes the regular scientific journal “Architecture and Urban Planning” within the series of RTU Scientific journals. Submission, review, editing and dfinal submission of scientific publications to the scientific journal is ensures by using the online Open Journals platform and publishes articles as Open Access. Since 2020, the scientific journal “Architecture and Urban Planning” has been indexed in SCOPUS data base.

Themes of theory projects and practical assignments of the study program The Faculty of Civil Engineering regularly publishes the journal “The Baltic Journal of Road and Bridge Engineering” https://bjrbe-journals.rtu.lv/ , included in SCOPUS and WEB of Science data bases.

In the doctoral study program research carried out has resulted in the defense of more than 20 doctoral theses. The research topics are related to the current topics related to the topic and are highly valued in the professional environment internationally and are a significant contribution to economic development. The significance of the doctoral study program is related to the goal of RTU strategy. Excellent science, which is related to the promotion of the international competitiveness and the increase of the quality of the scientific activity.

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

Academic staff have a real connection to the scientific environment. Students particularly appreciate the examples given by the academic staff from the professional environment and the related case studies, as well as interpretation. Academic staff are also up to date with the latest scientific findings and sectoral developments in Latvia and the world, which they share as part of their study courses, thus creating a unique set of knowledge, skills and competences to achieve study results.

Students are involved and participate in scientific conferences, develop publications together with the academic staff. Summarising and evaluating the involvement of academic personnel in scientific research at the national and international level (in the fields relevant to the content of the study programme) and the application of the obtained information in the study process, it can be concluded that it fully meets the requirements. For a full list of scientific publications, see the appendices in the creative and scientific biographies (CV) of each member of academic staff and the list of publications in the field of study for the reporting period.

Based on the information referred to in Paragraph 4.1, it can be concluded that the academic staff is highly qualified and independently improve their knowledge and apply it in the study process. Thus, the content of study courses is regularly updated and conforms with the modern trends in architecture and civil engineering. Information and knowledge gained from participation in various conferences and projects is applied in development and improvement of study courses.

The teaching staff involved in the study direction are also experts of the LCS (see Table 4.2).

Table 4.2

Experts of Latvian Science Council	
No.	Name, Last name
1	prof. Uģis Bratuškins
2	prof. Juris Smirnovs
3	prof. Diāna Bajāre
4	prof. Jevgenijs Barkanovs
5	prof. Anatolijs Borodiņecs
6	doc. Ģirts Būmanis
7	prof. Andris Čate
8	prof. Aleksandrs Korjakins
9	prof. Leonīds Pakrastiņš

10	prof. Dmitrijs Serdjuks
11	asoc. prof. Jānis Šliseris
12	asoc. prof. Andīna Sprince
13	doc. Baiba Gaujēna
14	prof. Tālis Juhna
15	prof. Jānis Kaminskis
16	asoc. prof. Kristīna Kokina
17	prof. Ainārs Paeglītis
18	vad. pēt. Aleksandrs Zajacs
19	prof. Atis Zariņš
20	asoc. prof. Jurģis Zemītis
21	prof. Sandra Treija
22	doc. Edgars Bondars
23	prof. Jānis Krastiņš
24	doc. Gerda Gaidukova
25	prof. Ineta Geipele
26	prof. Elīna Sarkane-Gaile
27	prof. Larisa Iļinska
28	prof. Maija Šeinfelde
29	asoc. prof. Airisa Šteinberga
30	asoc. prof. Tatjana Tombovceva

Currently FCE institutes are working on initiating new projects and attracting young researchers to the science and research projects to **develop their research skills and promoting the renewal of scientific employee.** The current FCE research work is focused on new areas such as BIM, laser scanning and its implementation for BIM, modelling of gravity field.

FCE undertakes financial support programmes for doctoral students and early-age researchers, as well as promoting activities related to the involvement of more active students in research (in national and international projects, in mobility programmes (Erasmus +, short time

scientific missions (STSM), conferences financed by COST actions etc.), and the recruitment of foreign scientists and PhD students. FCE is actively involved in the implementation of the post-doctoral research support programme “Postdoctoral research support”. This programme is provided to young scientists (from Latvia and from aboard) for implementation of postdoctoral research. The supporting projects that are being implemented must correspond to the smart specialization areas of Latvia and to have high commercialization potential. This is an effort to achieve all main goals of FCE Research Strategy. Additionally, early – age researchers at RTU have access to all open lectures, workshops or seminars provided by different entities and they are involved in research projects. Those RTU early – age researchers currently receiving ERDF funding for their individual research projects are required to ensure their skills development within the project framework that can include different type of training in home-institution or abroad.

Cooperation in targeted research fields is implemented by the academic and research staff of the Faculty of Architecture, as well as Master and Ph.D students. Interest of potential young researchers about research is encouraged by participation of students in the annual student conferences. Students have an opportunity to participate in research projects depending on the study level (Bachelor, Master or Ph.D) both as research assistants, as researchers, and also involvement of young researchers is provided in research project applications. This helps the young researchers to find their way in research.

Promotion of good research and helping young researchers to start successful career. The AF performs the following activities within the scope of the research program:

1. regular workshops and group meetings to inform the young scientists and students about ongoing research activities in RTU and AF; preparation of project proposals for the ERDF co-funded post-doctoral research program;
2. involvement of young researchers in various research projects; by involving the most motivated Bachelor and Master students in scientific research projects.

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

International cooperation is organised in all study programmes (Architecture, Civil Engineering, etc.) to promote scientific and applied research in doctoral and master's level programmes. Cooperation is aimed at establishing new contacts for the development of projects and research relevant for future cooperation.
FCE has an ability to attract students, doctoral students, and foreign researchers for implementation of existing and planned research projects, for example within HORIZON 2020 project “Sustainable, Accessible, Safe, Resilient and Smart Urban Pavements / SAFERUP “(01.03.2018.- 28.02.2022.). FCE is involved in collaboration with colleagues from Austria, Australia, Belgium, China, Germany, Spain, France, Italy, South Korea, United Kingdom and United States, and FCE involved foreign PhD student from India. Also, post- doctoral research programme is open for early-age researcher from any country of the world.

Research work performed in FCE is well aligned with **Latvia’s science, technology and innovation development (STID) policy** and **Latvia’s Research Priorities 2018 – 2021**, which

highlights the following priority directions:

1. Development and improvement of innovative materials:

- Research in materials science;
- To expand opportunities in Latvia to produce and use construction materials with new properties.

2. Research in the field of energy to promote energy efficiency and energy independence, as well as to reduce the use of fossil resources:

- Development of the energy sector;
- Promotion of Latvia's energy security;
- Alternatives to fossil fuel energy;
- Efficiency of benchmarking methods as an instrument of energy efficiency support (incl. Consumer reaction model, determination of energy consumption benchmarks in the most important sectors of energy consumption of enterprises in the Latvian economy, etc.).

3. Climate change mitigation and adaptation:

- Climate change, pollution, GHG reduction, moving towards low carbon development;
- Development of new climate technologies.

4. Development of new technologies, including transport:

- Technological development.

5. Development, implementation and application of the latest information and communication technologies:

- To ensure the development of information and communication technologies;
- Development of combined environmental perception systems (4D RADAR, LIDAR, visual, etc.);
- Development of intelligent systems;
- Society safety.

6. Industrial climate impact studies:

- Improvements in transport efficiency studies on the impact of traffic on the climate;
- Ungrouped challenges.

In order to ensure FCE successful participation in international projects, the following activities are implemented:

- Cooperation between structural units of the FCEs and establishing a working group for writing project proposals. The working group organises joint participation of FCE units in international and national projects with dividing the tasks in accordance with expertise of each unit. This has resulted in improved competitiveness of the FCE and number of successful projects and income is growing rapidly in the last two years.
- Establishing a fund to hire contractors specialising in drafting of project applications.
- Participation in seminars organised by the SEDA and the ESM and accumulation of knowledge on drafting project proposals.
- Successful involvement of FCE in the Horizon 2020 projects is ensured by:
    1. Participation in activities organized by COST, thus improving the international recognition of scientists and the FCE;
    2. Participation in the informative events organized by the European Commission on project calls and project applications criteria and writing e.g., info Day on the Horizon

2020 Work programme, Public-Private Partnerships Info Day, etc.
3. Participation in seminars organized by the Horizon 2020 National contact point.
4. A fund for participation in the events organized by the European Commission is established, in order to obtain information on the latest developments, calls and instructions for preparing the Horizon 2020 project applications.

In order to increase the competitiveness and scientific visibility of FCE, number of publications in the high ranked scientific journals has increased comparing with previous period (see attachment of Scientific publications). Publication output is taken into consideration for selection and employing of FCE personnel and it is one of the criteria for assessment of FCE units (departments) in the process of funding allocation (State budget funding) among them. FCE is a part of RTU and makes all efforts to increase number of publications especially published in the high ranked journals and open access journals.

RTU Data Management Policy sets guidelines for publishing research data and depositing them in **research data repositories**. **Research Development Fund**, set up and administered by RTU Research Office, provides financial support for publications in conference proceedings, international journals and Open Access journals. **The Research Council of the RTU** takes into consideration the targets set out in **RTU Strategy, annual plan**, and **RTU Data Management Policy** and supports researchers in publishing their research in international journals and conference proceedings.

Several important scientific journals are issued by FCE. Journal „The Baltic Journal of Road and Bridge Engineering" (ISSN: 1822-427X / eISSN: 1822-4288, https://bjrbe-journals.rtu.lv/index) is published by RTU Press with editorial board from FCE, Editor – in – Chief is A. Paeglitis. It is Open Access journal which is under a licence allowing readers to reuse the content without restriction and is indexed in Scopus and WOS. Journal "Construction Science" is a peer-reviewed scientific journal (ISSN 1407-7329 print, ISSN 2255-8551 online) with editorial board from FCE, Editor – in – Chief is G. Sahmenko. Since 2011 journal is published in English. It allows for unrestricted sharing of scholarly information and helps to promote knowledge throughout the world.

Since 2013, FCE organises the international conference „Innovative Materials, Structures and Technologies" (ones in two years, 2013, 2015, 2017). The conference is attended by students, researchers and industrial partners from Latvia and abroad. Conference papers are published at IOP Materials Science and Engineering, which is open access peer-reviewed scientific journal with editorial board from FCE, Editor – in – Chief is S. Rucevskis (leading researchers of FCE are taking part as reviewers). Journal is indexed in Scopus and WOS.

The research fields of the teaching staff of architecture programs conform with the trends of modern architecture theory, preservation of the cultural heritage, assessment of the effect of the climate change on sustainable environment planning, links of the urban development strategies with social processes and visual interpretation of the spatial environment in design, including use of ICT in design and planning, and research is performed in cooperation with researchers of other universities and countries.

The teaching staff of the study program implement international research projects:

"**Up-to-date information systems in urban regeneration**", the project of the Latvian-Lithuanian - Thailand scientific research support fund since 2020, participants S. Treija, U. Bratuškins, A. Koroļova, Kaunas University of Technologies and Thailand University of Technologies.

"The Big Reset on Neighbourhood Design" (Erasmus+, 2014-2017) the project challenging the

role of urban planners and designers, based on the ideat that the modern environment is not a static concept, rather it is a flowing concept open for several interpretations. In the project it is planned to clarify whether the neighbourhood can be designed and planned. This assumptions indicates the idea to work with the collective premises system and equipment improving their individual possibilities: the network and multifunctional spaces. Responsible teaching staff: Prof. U. Bratuškins, Pract. Ass. Prof. E. Bērziņš.

OIKOnet A Global Multidisciplinary Network on Housing Research and Learning – LifeLong Learning Programme, Erasmus. Lead by Prof. S. Treija, participants Prof. U. Bratuškins Assoc.Prof. E. Bondars. Available at: http://www.oikonet.org/;

“European Middle Class Mass Housing COST Action CA18137” (COST Action, 2018-2022). The project goal is creation of an intercountry network gathering European researchers who are engaged in research of middle class mass housing (MCMH) constructed in Europe since the 1950-ies. In urban and architecture research the value of MCMH is usually underestimated and comparative analysis and global perspectives are still missing. By intersecting various approaches, the main focus will be on architecture, urbanism, planning, state policy, history, sociology, new concepts and methodologies will emerge. It is intended for developing knowledge regarding the spatial shape, behaviour and satisfaction interaction and combining architecture and social analysis methodologies. Involved teaching staff: Prof. Sandra Treija.

Available at: https://www.cost.eu/actions/CA18137/#tabs|Name:overview

“Cities & Rail: Increasing potentials for Smart & Just Cities” (Baltic Sea Cooperation Seed funding**,** 2018-2019). The project goal is research about how the cities of the Baltic Sea region can optimise and use new investment potential in the regional railway network regarding both the mobility sustainability and equality aspects. Several major investments in the railway infrastructure are made around the Baltic Sea. We propose to study the sustainability and equality aspects of these investments in cooperation of the Swedish, Estonian and Latvian partners. While the project is led by academic institutions, important stakeholders will be involved there, for instance, developers of regional and urban policies, regional and urban transport companies, city planners and architects, as well as various public groups. Involved teaching staff: Prof. U. Bratuškins, Prof. S.Treija, Assist. Prof. E. Bērziņš

Urban Allotment Gardens in European Cities – Future, Challenges and Lessons Learned – TUD COST (European Cooperation in Science and Technology) Action TU1201. Participant of the management grouo Prof. S. Treija.

“**Implementing nature-based solutions for creating a resourceful circular city** COST CA17133” (COST Action, 2018-2022). The project topic is the issue of depletion of resources, the climate change and degradation of ecosystems faced by the cities all over the world, and these will increase if cities do not adapt. Implementation of nature based solutions (NBS) is among the elements for attaining this transition. They can provide a range of ecosystem services which are convenient for the city biosphere, for example, control of the micro climate, prevention of flood, water treatment, provision of food and many others. Adoption of the circulation economy concept by combining various types of services and returning resources to the city would increase the benefits for cities. Involved teaching staff and project participants - A. Koroļova; Prof. Sandra Treija.

Available at: https://www.cost.eu/actions/CA17133/#tabs|Name:parties

Restructuring of Study Programme in Architecture to Long-cycle Integrated Master in line with EU standards, 530440-TEMPUS-1-2012-1-METEMPUS-JPCR. Lead by Prof. U. Bratuškins, participants Prof. S. Treija, doc. A. Lapiņš.

In cooperation with Vilnius Gediminas Technical University, reviewing of the Ph.D Thesis by Matas Cirtautas "**Peculiarities of Urban Expansion in Lithuania**" (executed by Prof. U. Bratuškins). In cooperation with Ventspils municipal institution "Ventspils Muzejs", performance of the jury expert's function in the jury commission of evaluation of the sketch offers for **development of the sketch for a multifunctional building and territory improvement in Piejūras [Seaside] open-air museum** at Riņķu iela 2, Ventspils (executed by Prof. J. Krastiņš).

In cooperation with the Slovenian Science Agency (NM 88431452) on reviewing the **scientific research projects** (executed by Prof. J. Krastiņš).

In cooperation with Podkova Lesna (Poland) Culture and Citizen Initiative Centre, the report presented at the conference of the festival of the city of gardens "**Mežaparks genesis and urban building development**" (executed by Prof. J. Krastiņš).

The topics of the theory tasks and practical assignments of the study program are regularly updated and improved according to the industry topicalities. The results of research and creative work of the teaching staff and academic staff are regularly presented in scientific journals and conference materials, as well as architecture and art exhibitions. The variety of topics and genres reveals the broad range of interests of individual providing the informative and creative diversity of the teaching work within the global environment.

2.4.4. Specify the way how the higher education institution/ college promotes the involvement of the teaching staff in scientific research and/or artistic creation. Provide the description and assessment of the activities carried out by the academic staff in the field of scientific research and/or artistic creation relevant to the study field by providing examples.

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 (In Latvian)).

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 industry.

Efficiency of these mechanisms can be illustrated by growth of SCOPUS indexed publications in the period of 2013–2019. The total number of the publications increased from approximately 440 publications per year in 2013 to 865 in 2018. 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).

Academic and research staff are highly qualified specialists, academicians and corresponding members of the Latvian Academy of Sciences, experts in the humanities, arts and civil engineering from the Latvian Council of Science and foreign science agencies. For example, 2 academicians, 4 corresponding members and 30 experts from the LAS. For more information, see section 2.4.2.

The academic staff involved in the implementation of the Architecture programmes carry out resear ch in line with contemporary trends in architectural theory, the preservation of cultural heritage, th e assessment of the impact of climate change on sustainable environmental planning, the link betw een urban development strategies and social processes, and the visual interpretation of the spatial environment in design, including the use of ICT in design and planning. For example, three researchers are participating in the Latvian-Lithuanian-Taiwanese Science Cooperation Support Fund project "Up-to-date information systems in urban regeneration".

2.4.5. Specify how the involvement of the students in scientific research and/ or applied research and/or artistic creation activities is promoted. Provide the assessment and

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

RTU has mechanisms for involvement of students from all study levels and programs in research activities. There are activities aimed at strengthening the 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 to 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 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 career at RTU. Internal project calls provide additional funding for publishing articles in SCOPUS/WoS indexed editions, and internal projects within 6 research platforms stimulate 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 a 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 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 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 the 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 the establishment of DF Labs (http://rtudf.rtu.lv) for design and prototyping. 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.

Bachelor's degree programmes involve students in actual industry projects and practical research o f local interest.

Master's level study programmes involve students in national and international professional, research and scientific projects.

Doctoral level study programmes involve students in individual research and research projects at different levels, according to the doctoral thesis topic.

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

Innovative forms in the study direction are mainly related to innovations in the industry. The digitalisation process is developing gradually in the architecture and civil engineering industry in Latvia, however, acquisition of the new technologies and their use also in the daily study process is provided and ensured in study programs and the study process.

- Starting from 2018, the Faculty of Civil Engineering in cooperation with the University of Salerno (Italy) and the building materials production company "KNAUF" organizes summer schools "Sustainable Construction - from Traditions to Innovations". The first of them took place in Riga from 19 August to 30 August 2018 and was dedicated to sustainable construction (Internacionalizācija | Būvniecības inženierzinātņu fakultāte (rtu.lv) (In Latvian). Under the guidance of 15 faculty members, the 16 participants of the summer school explored the principles of sustainable construction in historic buildings as well as in contemporary construction. Students were divided into groups, and each developed a specific task, which was presented to the other participants and teachers of the end of summer school. In 2019, the school also took place in Riga, from July 28 to August 8. In 2021, the title of the summer school will be “Sustainable Construction: from re-use to new use”

(SustaCon21). It will take place between August 26 and September 3 in Salerno https://www.flipsnack.com/ClaudioGuarnaccia/sustacon-newsletter-issue-n-1-2021.html.

- In 2021, BIF in partnership with the manufacturer of dry and ready-to-use construction mixtures SIA "Sakret" has established a scientific laboratory for 3D concrete printing, laying the foundations for the use of innovative technologies in construction in the Baltics. 3D concrete printing is an innovative direction of scientific and technological development that is developing rapidly all over the world. Technology is sustainable, ensures the efficient use of human resources and materials, and offers the architectural and construction industries almost endless possibilities in terms of freedom of shape, size and structure. The laboratory will be able to print concrete mass, develop prototypes for 3D printing of objects or construction details, research and test innovative materials, test printed objects. Research conducted in the laboratory could become the basis for the development of standards so that 3D technologies can be used for the construction of various buildings not only in Latvia, but also in Europe. It is planned to become an open access science platform for 3D concrete and other building materials printing.
- In 2020, Department of Civil Building Construction established the Construction Digitalization Center (BDC), the director of which is lecturer Kristaps Ritvars Ronis. In the spring of 2020, BDC organized a conference “BIM in Higher Education - Necessity and Challenges”, where Raitis Bušmanis, BIM Manager of RB Rail JSC, presented the need and challenges of BIM specialists in creating the largest infrastructure project in the Baltic States. The keynote speaker at the conference, Professor Lamine Mahdjoubi from the University of the West of England (UWE), who has developed a BIM master's program at her university and is currently continuing to lead and improve it, introduced the university's role in developing this field. During this visit of the British professor, several co-operation meetings were organized between Riga Technical University Development and Studies Department, Faculty of Civil Engineering, BDC, UWE, Ministry of Economics (EM), Latvia University of Agriculture, British Embassy and industry representatives from the Construction Industry Digitization Association and Latvian Construction information modeling societies, which discussed the implementation of the BIM roadmap in higher education developed by the MoE and signed by all parts involved in the meetings, the UWE's experience in this process and the necessary support. In the autumn of 2020, BDC organized free training courses “Construction Information Technologies”, in which cooperation was established with LLC Latvijas standarts and LLC CMB Inženieru kompetences centrs. More than 250 Latvian construction industry specialists were trained in these courses. The course consisted of three training modules: BIM modeling, BIM coordination and BIM information management. In 2021, BDC acquired the right to implement practical BIM training for 800 industry specialists in 6 training modules - BIM modeling in architecture and building design, BIM modeling in engineering system design, BIM coordination, practical implementation of BIM in the company and best practices, use of BIM compatible model in construction process and 3D technologies acquisition, processing of input data, development of BIM models and construction control.
- Since March 2020, RTU has started to teach study courses in distance learning using tools like Microsoft Teams, Zoom, etc.

Students have access to the Design Factory where it is possible to use 3D printers, CNS milling machines and various tools for preparing study projects. Workshops and activities in summer schools, by producing models of the scale 1:1, are organised for providing practical skills and experience.

In cooperation with municipalities modern urban environment studies are performed by offering students to study in-depth particular topicalities and issues and to apply the innovative assessment, scaling and solution finding methods acquired in study courses.

Innovation influences the acquisition of theory and practical skills in the study process. Students' involvement in solving problems of enterprises takes place in the study course "Innovative Product Development and Entrepreneurship". The course of study complements students' knowledge and practical skills with general experience in entrepreneurship and problem-solving methodologies.

In all fields of study, students' understanding and knowledge of the importance of innovation in indusry is developed at the appropriate level of study.

2.5. Cooperation and Internationalisation

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

Faculty of Architecture cooperates with a number of state, municipal and public organizations. The leading teaching staff of the FA are members of the Latvian Association of Architects (LAA), and Professors Uģis Bratuškins, Sandra Treija and Jānis Krastiņš have been elected to the Council of the LAA. Teaching staff of the FA regularly participates in working groups and commissions of the Ministry of Economics (MoE), Ministry of Culture (MoC), Latvian Builders Association (LBA), Latvian Union of Civil Engineers (LUCI) and other institutions. Prof. U. Bratuškins is a member of the National Council of Architecture of the Moc, and a consultant of the Council for the Preservation and Development of the Riga Historical Center, as well as a jury member of the annual competitions of "The Energy-efficient Building of the Year" (MoE), "The High-quality Structure of the Year" (LBA) and "The Great Award of the Construction Industry of the Year" (LUCI). Prof. J. Krastiņš is a member of the Riga City Monuments' Council, and Prof. J. Krastiņš and Assist. Prof. Egons Bērziņš is a member of the Riga City Architect's Board.

The cooperation of the Faculty of Civil Engineering with professional associations of the construction industry is constructive and long-lasting. Since the faculty has four fields of study programmes – Civil Engineering, Transportation Engineering, Geomatics and Heat, Gas and Water Technologies, cooperation also takes place with professional associations of these fields. The teaching staff of the Civil Engineering study programme participate in the work ofthe Latvian Board of Civil Engineers. Dean of Civil Engineering faculty professor M. Vilnītis has been leading the Education Section of the Latvian Board of Civil Engineers for several years and jointly with the industry evaluates the course and quality of the study process. Professor A. Paeglītis, Director of the Transportation Engineering Programme, is active in the Latvian Transportation Engineering Association. Professor A. Borodiņecs and Professor E. Dzelzītis, Director of the Study Programme for Heat, Gas and Water Technologies, were elected to the Board of the Latvian Union of Heat Gas and Water Technology Engineers. The geomatics study programme is represented on the Board of the Latvian Society of Surveyors by Assistant Professor Jānis Klīve. It should be noted that in September 2021 J. Klīve was elected vicepresident of the Council of European Geodetic Surveyors, which confirms the high appreciation of our colleague's work also in the context of the whole Europe.

The selection of universities is consistently carried out within the limits of the matching of study fields. Cooperation institutions and non-governmental organisations are selected within the framework of their respective sectors.

Cooperation partners from industry are selected according to the interests of study programme development, for example, by attracting guest lecturers, creating internships, developing laboratory work, etc. The partners are linked to the themes and scientific research of the study programmes.

Collaboration with industry organisations and companies promotes knowledge- andexperience-based skills in study courses.

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

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.

- Professional associations, students organisations, other higher education institutions, undertakings and organisations, etc. have cooperation partners;
- The academic staff of the architecture programs participate in a range of international foundations and implementation of international projects, including the following: Europena Association of Architecture Education (EAAE/AEEA); European Association of Schools of Planning (AESOP); European Network of Heads of Schools of Architecture (ENHSA); Nordic Countries Academy of Architecture (NordArk); Centre of Documentation of Modernism Monuments and Sites (DoCoMoMo); TEMPUS project "Restructuring of univeristy education programs in architecture and reconciliation with the EU standards requirements in Montenegro"; the international network of identification of the cold war consequences and heritage „ClosedCities"; COST campaign TU1201 "Urban Allotment Gardens in European Cities – Future, Challenges and Lessons Learned"; OIKONET project "A Global Multidisciplinary Network on Housing Research and Learning".
- Faculty of Civil Engineering is one of founders of International Baltic Association for Geometry and Engineering Graphics BALTGRAF.It is non-profit scientific society established in 1991 to promote the International exchange of knowledge in the field of Descriptive Geometry and Engineering Graphics, including Computer Aided drafting and Computer Aided Design aspects and emphasizing their role in engineering core education. The Association has 11 Institutional members in three Baltic countries – Estonia, Latvia and Lithuania.
- Starting from 2007, BIF represents RTU in the European Civil Engineering Education and Training Association (EUCEET) promotes cooperation between higher education institutions offering programs in civil engineering. The main activities of the Association in pursuing its objectives are participating to programs of the European Commission; organizing

Conferences, Symposia and Workshops and publishing proceedings as necessary; establishing and maintaining a data bank on degree courses within higher education institutions in Europe in the field of civil engineering; publishing a regular newsletter to be circulated to the membership; collaborating with other international organizations with related interests (euceet.eu).

Starting from 2005, BIF represents RTU in the the Association of European Civil Engineering Faculties (AECEF) with the participation of civil engineering faculties from non-European countries was founded in 1992. The main goals of the Association are to establish conditions for close co-operation among Civil Engineering faculties, from different countries; to contribute to the dissemination and application of the latest civil engineering research and teaching, especially in the finding of improvements to the environment; to support the Europe-wide development and spread of new construction technologies; to work toward compatibility among the curricula of Civil Engineering faculties as a starting point for the exchange of students and the mutual acceptance of graduates in civil engineering practice in Europe; to work toward the implementation of study and lecture visits to foreign universities by teachers, research workers and students. (https://web.fe.up.pt/~aecef).

The selection of foreign universities is consistently carried out within the limits of the matching of study fields. Cooperation institutions and non-governmental organisations are selected within the framework of their respective sectors.

Foreign partners from industry are selected according to the interests of study programme develop ment, for example, by attracting guest lecturers, creating internships, developing laboratory work, etc. The partners are linked to the themes and scientific research of the study programmes.

Collaboration with industry organisations and companies promotes knowledge- andexperience-based skills in study courses.

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

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. In order to ensure a permanent presence and the provision of quality information about studies at RTU and the selection of students, RTU has opened its own information and study centres in specific countries.

Various virtual seminars are widely used to address potential students, with the participation of RTU ICFSD employees, existing delegated employees of students and study program directors, who acquaint prospective students with RTU infrastructure, study opportunities and requirements for foreigners, study program content, further study opportunities, as well as career opportunities after graduation.

ICFSD foreign student admission staff provides potential students with the opportunity to use online consultations to solve issues related to admission and study program selection. Consultations are arranged by appointment, every week, for a period of two months before the end of the admission period.

Potential students who have provided their contact information to RTU in connection with the commencement of studies, but have not submitted their applications for studies, are regularly addressed at least once a month.

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.

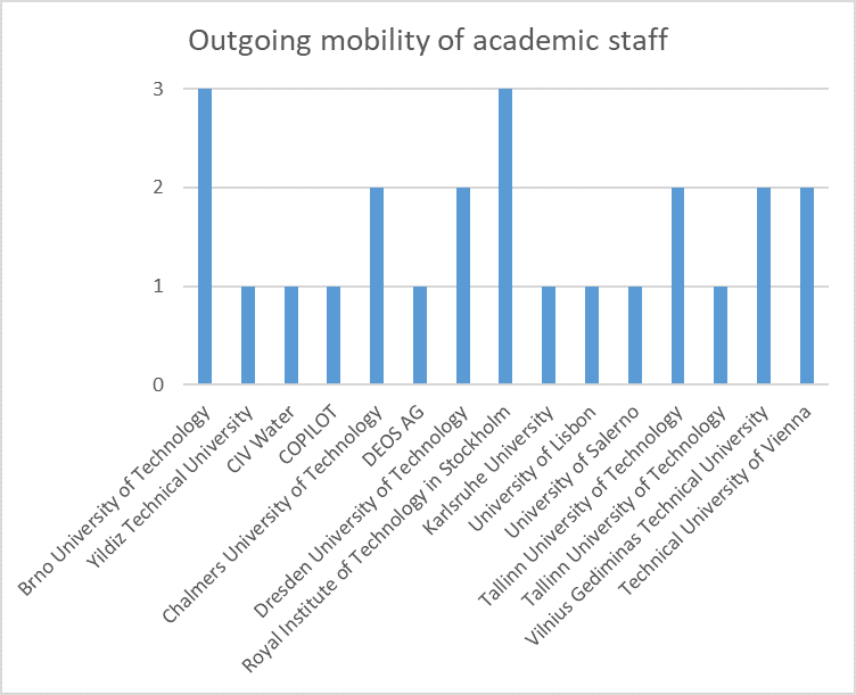
RTU foreign student enrolment rates are summarized starting with academic year 2012/2013, indicating whether the student is pursuing undergraduate or graduate studies. The number implies only students enrolled in the first year.

		2014./15.		2015./16.		2016./17.		2017./18.		2018./19.		2019./20.		2020./21.	
bakalaura studijas	DIEN	9	15%	5	8%	7	7%								
	MOB	51	85%	42	71%	54	53%	30	63%	25	69%	25	64%	48	80%
maģistra studijas	DIEN			1	2%	6	6%	8	17%	5	14%	14	36%	8	13%
	MOB			10	17%	29	28%	10	21%	3	8%				
doktora studijas	DIEN									2	6%			4	7%
	MOB			1	2%	6	6%			1	3%				
KOPĀ		60		59		102		48		36		39		60	

The number of applications processed 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.

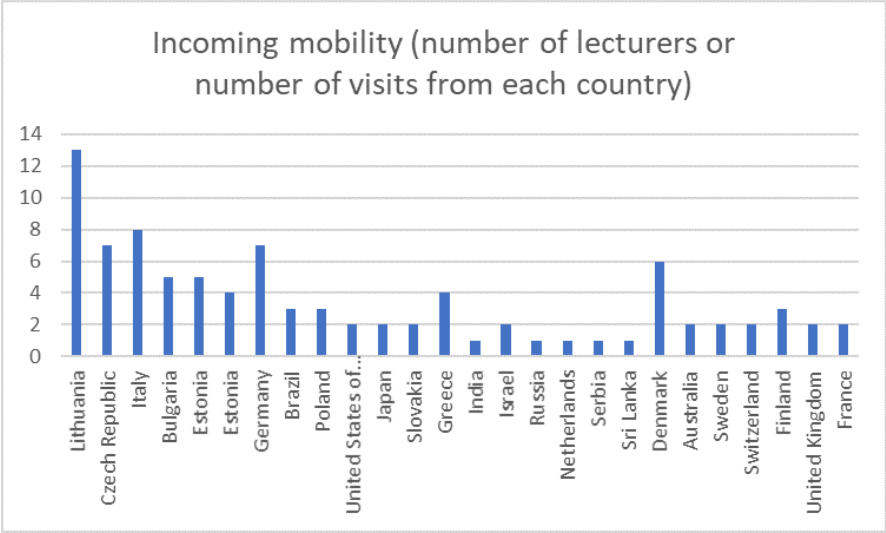
During the reporting period 17 teaching staff members have used outgoing mobility on 26 occasions. The number of mobilities has increased during the last years with 8 teaching staff members participating in mobility per academic year. Most visits have been to Estonia, Lithuania followed by Germany, Austria and Spain. Visits depend on individual factors related to cooperation in research or academic work. See the list of teaching staff members and visited countries within the scope of mobility in Annex. See the split of outgoing mobility of academic staff per universities and exchange locations in Chart 3.7.4.

Chart 3.7.4.



Also foreign teaching staff has been involved in implementation of the study programs of the study direction. ERASMUS+ Mobility Program and also other opportunities related to participation in joint international projects are used for attracting guest lecturers. During the reporting period the incoming mobility was used by 92 academic staff members. The number of mobilities during the reporting period is similar every year, except year 2020, which is related to the epidemiological situation globally, and on average 15 teaching staff members have participated in mobility per academic year. Most academic staff members have been from Lithuania, following by Czech Republic and Italy, Denmark, Bulgaria, Estonia, Germany, Greece, Finland and Portugal. Academic staff has also come from countries, like Brazil, Poland, the United States of America, Japan, Slovakia, etc. See the list of teaching staff and the countries from which the teaching staff has come in the Annex on the Incoming Mobility of Teaching Staff, and the split per countries in Chart 3.7.5.

Chart 3.7.5.



The mobility has achieved recognised results (92 incoming mobility academic staff, 21 outgoing mobility academic staff). The plan is to increase or maintain mobility in the future, but t

here are some difficulties in planning mobility, as well as in the workload and workload of the acade mic staff in the industry.

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

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

According to the experts' assessment, during the preceding accreditation of the study direction several recommendations of the assessment commission were provided in relation to improvement of the building infrastructure, operation of subsidiaries and their infrastructure, as well as optimisation of study programs and the process.

Recommendations regarding the **condition of the premises and infrastructure** used for the programs of the study direction were applied both the buildings and infrastructure of the faculty and institutes, as well as the buildings and of regional subsidiaries and their capacity of use. During the period following the preceding accreditation, the university buildings have been renovated and adapted to modern requirements. Also new buildings have been constructed in the university campus and the renovation works of buildings are continued. Thanks to the digital booking system of premises for the needs of implementation of studies, it is possible to book premises of correct size with necessary equipment. Although the last study period was implemented remotely, installation of necessary equipment in premises is continued for provision of high quality audio and video recordings or online broadcasting of lectures and seminars.

Subsidiaries of the university have been transformed into Regional Study and Science Centres as from 1 March 2020 and both their infrastructure and technical equipment is being improved. In Liepāja it is planned to use new premises with equipment conforming with the requirements of the study process for the study process. The **remote learning opportunities** referred to in the experts' recommendations and intended for supporting access to information by students at regional subsidiaries have been improved by adding digitalised content to study courses and structured information of study courses within the framework of the Study Digitalisation project.

Recommendations regarding **improvement of the quality of the study process** by introducing more efficient use of feedback have been implemented both within the study direction and on the level of the university. Survey results are summarised every semester, and since implementation of remote studies, surveys have been performed twice a semester in order to respond faster to deficiencies and difficulties experienced by students. RTU Quality policy has been updated since 2017 by incorporating the internal quality management system, also the RTU Excellence Approach has been approved. Data available in ORTUS are used for improving the quality of the study process.

Students' mobility is also an important component of the quality of the study process, as well as preparedness and qualification of students to acquire the study content in English, according to the experts' recommendations to implement a part of the study programs in English. During the period

since accreditation, both the number of students going to other universities and studying 1-2 semesters outside Latvia and the incoming students participating in communication and the study process, thus increasing the possibility of using English for other students, have increased.

The experts' recommendation to improve integration of **the study internship results in the study process** has been implemented by both updating the formal internship documents and definition of assignment, as well as by identifying additional aspects for improvement of the internship process within the study process in surveys of employers.

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

During the reporting period one study program was licensed within the study direction "Architecture and Civil Engineering":
On 10 June 2020 the **academic Bachelor study program "Civil Engineering"**, licence number 04051-184. The study program was developed based on the offer of the European and global market and the potential demand by developing studies in English, as well as attainment of the RTU strategic goals. The study program is assessed as highly demanded, a high proportion of students in it is envisaged, as well as support was received from professional associations and organisations. Completion of the plan of implementation of the recommendations provided by the licensing experts is attached.

Annexes

I - Information on the Higher Education Institution/ College		
Information on the implementation of the study field in the branches of the higher education institution/ college (if applicable)		
List of the governing regulatory enactments and regulations of the higher education institution/ college	List of the internal regulations.zip	Ieksejo normativo aktu saraksts.zip
The management structure of the higher education institution/ college	RTU_Management_Structure.pdf	RTU_parvaldibas_struktura.pdf
II - Description of the Study Field - 2.1. Management of the Study Field		
Plan for the development of the study field (if applicable)	Development_plan_EN.pdf	Attistibas_plans_LV.pdf
The management structure of the study field	RTU_Study_Direction_Management_Structure.pdf	RTU_studiju_virziena_parvaldibas_struktura.pdf
A document certifying that the higher education institution or college will provide students with opportunities to continue their education in another study programme or another higher education institution/ college (agreement with another accredited higher education institution or college) if the implementation of the study programme is terminated.	Agreement.zip	Vienošanās.zip
A document certifying that the higher education institution or college guarantees compensation for losses to students if the study programme is not accredited or the study programme license is revoked due to actions (actions or omissions) of the higher education institution or college and the student does not wish to continue studies in another study programme.	Confirmation - on compensation for losses.edoc	Apliecinājums - par zaudējumu kompensāciju.edoc
Standard sample of study agreement	Study_agreements.zip	Studiju līgumi.zip
II - Description of the Study Field - 2.2. Efficiency of the Internal Quality Assurance System		
Analysis of the results of surveys of students, graduates and employers	Surveys by programmes_EN.zip	Aptaujas pa programmam_LV.zip
II - Description of the Study Field - 2.3. Resources and Provision of the Study Field		
Basic information on the teaching staff involved in the implementation of the study field	Basic information about the academic staff involved in the implementation of the study direction_EN.xlsx	Pamatinformācija par studiju virziena īstenošanā iesaistītajiem mācībspēkiem_LV.xlsx
Biographies of the teaching staff members (Curriculum Vitae in Europass format)	CV_EN.zip	CV_LV.zip
A statement signed by the rector, director, head of the study programme or field that the knowledge of the state language of the teaching staff involved in the implementation of the study programmes within the study field complies with the regulations on the state language knowledge and state language proficiency test for professional and official duties.	Confirmation - knowledge of the state language.edoc	Apliecinājums - valsts valodas prasme.edoc
A statement of the higher education institution/ college on the respective foreign language skills of the teaching staff involved in the implementation of the study programme at least at B2 level according to the European Language Proficiency Assessment levels (level distribution is available on the website www.europass.lv, if the study programme or part thereof is implemented)	Confirmation - knowledge of the foreign language.edoc	Apliecinājums - svešvalodu prasme.edoc
II - Description of the Study Field - 2.4. Scientific Research and Artistic Creation		
Summary of quantitative data on scientific and/ or applied research and / or artistic creation activities corresponding to the study field in the reporting period.	Compilation of quantitative data_EN.pdf	Kvantitatīvo datu apkopojums_LV.pdf
List of the publications, patents, and artistic creations of the teaching staff over the reporting period.	Publications_Patents_Creativity.zip	Publikacijas_patenti_jaunrade.zip
II - Description of the Study Field - 2.5. Cooperation and Internationalisation		
List of cooperation agreements, including the agreements for providing internship	Coorperation_agreements.pdf	Sadarbibas_ligumi.pdf
Statistical data on the teaching staff and the students from abroad	Foreign students_academic staff.pdf	Arzemju studenti_macibspeki.pdf
Statistical data on the incoming and outgoing mobility of students (by specifying the study programmes)	Mobility by programmes_EN.zip	Mobilitate pa programmam_LV.zip
Statistical data on the incoming and outgoing mobility of the teaching staff	Incoming_outgoing mobility accademic staff.pdf	Ienakosa_izejosa mobilitate macibspeki.pdf
II - Description of the Study Field - 2.6. Implementation of the Recommendations Received During the Previous Assessment Procedures		
Report on the implementation of the recommendations received both in the previous accreditation and in the licensing and/ or change assessment procedures and/ or the procedures for the inclusion of the study programme on the accreditation form of the study field.	Annex 3.pdf	3. pielikums.pdf
An application for the evaluation of the study field signed with a secure electronic signature	01000-2.2.1-e_299.edoc	01000-2.2.1-e_299.edoc
III - Description of the Study Programme - 3.1. Indicators Describing the Study Programme		
Sample of the diploma and its supplement to be issued for completing the study programme	RABA_dipl_EN.zip	Diplomu paraugiLV_Eng.zip
For academic study programmes - Opinion of the Council of Higher Education in accordance with Section 55, Paragraph two of the Law on Higher Education Institutions (if applicable)	Nr_85_RTU_MG_Kopīgā_par+250+stud (in Latvian).pdf	Nr_85_RTU_MG_Kopīgā_par+250+stud.pdf
Compliance of the joint study programme with the provisions of the Law on Higher Education Institutions (table) (if applicable)		
Statistics on the students in the reporting period		
III - Description of the Study Programme - 3.2. The Content of Studies and Implementation Thereof		
Compliance with the study programme with the State Education Standard		RBMI0 6. pielikums.pdf
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard or the requirements for professional qualification (if applicable)		
Compliance of the study programme with the specific regulatory framework applicable to the relevant field (if applicable)		
Mapping of the study courses/ modules for the achievement of the learning outcomes of the study programme	RBCT0 8.pielikums ENG.docx	8.pielikumsLV.pdf
The curriculum of the study programme (for each type and form of the implementation of the study programme)		RAGA0_Planojums_LV.pdf
Descriptions of the study courses/ modules	Annex 10. Description of Study Courses_RICH0.zip	10. pielikums_BMI0.pdf
Description of the organisation of the internship of the students (if applicable)		
III - Description of the Study Programme - 3.4. Teaching Staff		
Confirmation that the academic staff of the doctoral study programme includes not less than five doctors, of which at least three are experts approved by the Latvian Council of Science in the branch or sub-branch of science in which the study programme intends to award a scientific degree (if applicable)		

Confirmation that the academic staff of the academic study programme complies with the requirements specified in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions (if applicable)		

Other annexes

Name of document	Document
RTU IT sistemu saskarnes.zip	RTU IT sistemu saskarnes.zip
Screenshots of RTU IT systems.zip	Screenshots of RTU IT systems.zip
RTU_studejoso_priek_un_sudz_iesn_un_izsk_kart.pdf	RTU_studejoso_priek_un_sudz_iesn_un_izsk_kart.pdf
RTU_proposals_complaints.pdf	RTU_proposals_complaints.pdf
Materiāltehniskais nodrošinājums	Materialtehniskais nodrosinajums.pdf
Technical Support	Technical support_EN.pdf
RTU IT sistemu saskarnes.zip	RTU IT sistemu saskarnes.zip
Screenshots of RTU IT systems.zip	Screenshots of RTU IT systems.zip
Par minimālo studējošo skaitu studiju programmās	Par_minimālo_studējošo_skaitu_studiju_programmās.pdf
On minimal number of students in study programmes	On_minimal_number_of_students_in_study_programmes.pdf
Studiju virziena "Arhitektūra un Būvniecība" abreviatūru atšifrējumus	Abreviaturu atsifrejumus LV.pdf
Abbreviations of the study field "Architecture and Civil Engineering"	Abbreviations EN.pdf
Finansējuma sadalījums starp izmaksu pozīcijām / Funding distribution between the cost items	Studiju_programmu_finansejuma_sadalijums.pdf
6. annex RBGSO ENG.pdf	6. annex RBGSO ENG.pdf
6. pielikums_RBGSO.pdf	6. pielikums_RBGSO.pdf
7.pielikums_Arh_Mag_prof_standarts_LV_.pdf	7.pielikums_Arh_Mag_prof_standarts_LV_.pdf
Annex_7_profesional_standard_Architecture_.pdf	Annex_7_profesional_standard_Architecture_.pdf
RBCT0 9.pielikums full-time studies ENG.pdf	RBCT0 9.pielikums full-time studies ENG.pdf
RBCT0 9.pielikums nepilna laika neklâtiene.pdf	RBCT0 9.pielikums nepilna laika neklâtiene.pdf
RBCT0 9.pielikums part-time studies ENG.pdf	RBCT0 9.pielikums part-time studies ENG.pdf
RBCT0 9.pielikums pilna laika klâtiene.pdf	RBCT0 9.pielikums pilna laika klâtiene.pdf
RBCT0 10.pielikums Studiju kursu apraksti_full-time studies_EN.pdf	RBCT0 10.pielikums Studiju kursu apraksti_full-time studies_EN.pdf
RBCT0 10.pielikums Studiju kursu apraksti_nepilna laika neklâtiene_LV.pdf	RBCT0 10.pielikums Studiju kursu apraksti_nepilna laika neklâtiene_LV.pdf
RBCT0 10.pielikums Studiju kursu apraksti_part-time studies_EN.pdf	RBCT0 10.pielikums Studiju kursu apraksti_part-time studies_EN.pdf
RBCT0 10.pielikums Studiju kursu apraksti_pilna laika klâtiene_LV.pdf	RBCT0 10.pielikums Studiju kursu apraksti_pilna laika klâtiene_LV.pdf
RBGT0 10.pielikums Studiju kursu apraksti_EN_1 gads.pdf	RBGT0 10.pielikums Studiju kursu apraksti_EN_1 gads.pdf
RBGT0 10.pielikums Studiju kursu apraksti_EN_2_5 gads.pdf	RBGT0 10.pielikums Studiju kursu apraksti_EN_2_5 gads.pdf
RBGT0 10.pielikums Studiju kursu apraksti_LV_1 gads.pdf	RBGT0 10.pielikums Studiju kursu apraksti_LV_1 gads.pdf
RBGT0 10.pielikums Studiju kursu apraksti_EN_2_5 gads.pdf	RBGT0 10.pielikums Studiju kursu apraksti_EN_2_5 gads.pdf

Architecture (47581)

Study field	*Architecture and Construction*
ProcedureStudyProgram.Name	*Architecture*
Education classification code	*47581*
Type of the study programme	*Professional master study programme*
Name of the study programme director	*Uģis*
Surname of the study programme director	*Bratuškins*
E-mail of the study programme director	*ugis.bratuskins@rtu.lv*
Title of the study programme director	*Dr. arch*
Phone of the study programme director	
Goal of the study programme	*Master's Professional Study Programme "Architecture" is aimed at providing students with the knowledge and skills necessary for practical work under the guidance of a certified architect, as well as in the framework of established procedure to apply for independent practice rights in accordance with international and national requirements:* ** UNESCO/UIA Charter for Architectural Education,* ** Directive 2005/36/EC, amended by the Directive 2013/55/EC on the recognition of professional qualifications,* ** Rules No 194 of the Cabinet of Ministers as of 21st May 2002 on "Minimum requirements for the educational programs leading to the professional qualification of architect",* ** Rules No 264 of the Cabinet of Ministers as of 23rd May 2017 on "Rules on Standard Classification of Occupations, basic tasks that comply with the occupation and basic demands of qualification".*
Tasks of the study programme	*The tasks of the study programme are:* ** to provide students with in-depth theoretical and practical knowledge of a complex development project design principles to meet the complex aesthetic and technical aspects of environmental design requirements;* ** to provide in-depth knowledge of architecture and related arts, technology and the humanities in the history and theory of sciences, as well as in the preservation and protection of the cultural and historical environment;* ** to provide in-depth knowledge in spatial planning and planning-related sectors;* ** to deepen comprehension of the interrelationship between people and buildings, as well as the environmental context and the importance of the choice of scale;* ** to deepen comprehension of the profession of an architect and the role of an architect in society, especially about the social factors;* ** to provide comprehension of the tectonic structure of a building, construction technology and engineering interdisciplinarity and digitization;* ** to provide comprehension of the industries, institutions, rules and procedures associated with the project implementation of the concept and ensuring coherence between different levels of planning.*

Results of the study programme	*The study programme graduates:* *• are able to create architectural designs that satisfy both aesthetic and technical requirements;* *• have adequate knowledge of the history and theory of architecture and the related arts, technologies and humanities;* *• have knowledge of fine arts as an influence on the quality of architectural design;* *• have adequate knowledge of urban design, planning and the skills involved in the planning process;* *• comprehend the relationship between people and buildings, and between buildings and environment, and of the need to relate buildings and the spaces between them to human needs and the choice of adequate scale;* *• comprehend the profession of architect and the role of the architect in society, in particular, the social factors;* *• comprehend the methods of investigation and preparation of the brief for a design project;* *• comprehend the structural design, constructional and engineering problems associated with building design;* *• have adequate knowledge of physical problems and technologies and of the function of buildings so as to provide them with comfortable internal conditions and protection against the climate, in the framework of sustainable development;* *• have the necessary design skills to meet requirements of building contracting authority within the constraints imposed by cost factors and building regulations;* *• have adequate knowledge of the industries, organizations, regulations and procedures involved in implementation of design concepts into buildings and integrating plans into the overall planning*
Final examination upon the completion of the study programme	*At the end of the programme, a MA Thesis with an integrated diploma project is independently developed on the topical issues of environmental development, where the student demonstrates the knowledge and skills acquired during the studies. The MA Thesis with an integrated diploma project is defended at an open meeting of the State Examination Commission. The commission consists of both RTU professors and representatives of the profession. MA Thesis with integrated diploma project is evaluated in a 10-point evaluation system in accordance with the RTU Study Result Valuation Regulations (Protocol No. 539 of 29 March 2010).*

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)	*bachelor degree in architecture and urban planning, or comparable education*

Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Professional Master Degree in Engineering Science of Architecture*
Qualification to be obtained (in english)	*Architect*

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)	*Bachelor's degree in architecture and urban planning, or comparable education, level of English language proficiency at least B2.*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Professional Master Degree in Engineering Science of Architecture*
Qualification to be obtained (in english)	*Architect*

Places of implementation

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

3.1. Indicators Describing the Study Programme

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

The goal of the professional Master study program "**Architecture**" (further in the text – the study program) is to provide students with the knowledge and skills necessary to start practical work under guidance of a certified architect, and to claim the rights of permanent professional practice according to the procedures set by the Republic of Latvia.

Graduates of the study program after public presentation of their Master Theses and diploma projects obtain a professional Master degree (Mg) in Architecture and qualification of an architect. The volume of the study program is 80 CP or 120 ECTS, and the nominal duration of full-time studies is 2 years. The study program is provided in Riga in Latvian and in English.

During the reporting period, certain changes were made to the study program that increased the volume of professional study courses and balanced the ratio of internship and studies following expert recommendations and results of student surveys. The study courses EEM731 "Electrical systems in architecture" 2 CP and "Reinforced concrete and walls" 4CP were moved from the study program to the Bachelor study program to let all study courses related to constructions and utility lines be acquired within the undergraduate study program. The study program was supplemented with a new study course BBK740 "Structural Systems" to be completed within one academic term with a final diploma project, thus providing students with consultations on buildings and building structures both in general and with regard to the topic of their thesis.

The study program was supplemented with the 2 CP study course AAP713 "Historical Building Fabric and Conservation Methods" (academic staff member Ilmārs Dirveiks) and 2 CP AAP706 "Sustainable Development of Spatial Environment". Compulsory 26 CP for internship were distributed between two academic terms - in the volume of 11 CP and 15 CP (previously the internship volume distribution was 8 and 18 CP). Also, distribution of the CP for the thesis across studies in the 2nd, 3rd and 4th academic terms was changed from 5/2/19 CP to 3/5/18 CP to give students sufficient time for research and project design.

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

The study program "Architecture" corresponds to the study direction "Architecture and Civil

Engineering" and students acquire the necessary knowledge in the field.
The title of the study program, the degree to be obtained, the professional qualification, the aim, the tasks, the study results and the admission requirements are interrelated and appropriate.
The title of the study program “Professional Master's Study Program in Architecture” follows from the professional qualification obtained as a result of studies Architect, it corresponds to the Master's degree in Architecture obtained as a result of studies.
The aim of the study program is to strengthen the knowledge and skills acquired during Bachelor studies, increasing and enhancing awareness about spatial planning and disciplines related thereto and to educate and train fully-fledged educated specialists both for private entrepreneurship and for work in state and municipal architecture and planning institutions in the field of spatial planning.

The study program is implemented in accordance with the Law of the Republic of Latvia of 2 November 1995, Law on Higher Educational Institutions, RTU Constitution, RTU Senate resolutions, as well as following the latest developments in the fields of RTU research and spatial planning in Latvia, Europe and the world. It is focused on education and training of the next generation of architects according to the report adopted by the Parliament of the Republic of Latvia of 22 May 2014 “Education development guidelines for 2014–2020”, as well as other international and national acts:

- UNESCO/UIA Charter for Architectural Education,
- EU directive 2013/55/EK, amending Directive 2005/36/EK on the recognition of professional qualification,
- LV 20.06.2001. Law on the regulated professions and recognition of professional qualification,
- LV MK 21.05.2002. Cabinet Regulations No. 194 “Minimum requirements for the educational programs leading to the professional qualification of an architect”,
- LV MK 23.05.2017. Cabinet Regulations No. 264 „Classification of occupations, baseline tasks consistent with an occupation, and basic qualification requirements”.

The tasks of the study program are determined in accordance with the fact that as a result of their implementation the goal of the program “to provide students with the set of knowledge and skills necessary to start practical activities under the guidance of a certified architect, as well as to apply for the right of professional independent practice in accordance with international and local regulatory instruments ’. The tasks of the study program are formulated to provide students with in-depth theoretical and practical knowledge of the principles of complex development projects to meet the complex aesthetic and technical requirements of the environment, in-depth knowledge of the history of architecture and related arts, technology and humanities; theory, as well as the preservation and protection of the cultural and historical environment, provide in-depth knowledge of spatial planning and related sectors, in-depth understanding of the interrelationship between people and buildings, the environmental context and the importance of adequate choice, in-depth understanding of the , in particular on social factors, to ensure an understanding of the interrelationships and digitalisation of the tectonic structure of a building, construction technologies and engineering disciplines, and to provide an understanding of the industries, institutions, rules and procedures for the implementation of the project concept and the coherence between the different levels of planning.
The tasks are defined so that the acquisition of optimal competencies in accordance with the goal, so that the graduates of the program are able to professionally manage and perform construction design preparation, research and solution development, organize and manage spatial design development processes and assess the quality of results with public involvement - according to a professional master's degree and qualifications.
Thus, the study results to be achieved as a result of mastering the study program are interrelated and in accordance with the tasks of the program and are directly aimed at achieving the goal.

The requirements for admission to the study program are designed in such a way that students with a higher evaluation of previous studies would be matriculated in the studies first of all, who would be able to obtain competencies, degrees and professional qualifications corresponding to the goal and tasks of the program.
RTU approves and publishes the admission requirements and criteria for the following year by November 1 of each year. The study program and admission procedure are introduced to future students at RTU information days and at the annual exhibition "School". Admission is provided by the RTU Admission Commission.
Admission requirements include general conditions. RTU evaluates and recognizes study courses acquired in other accredited and state-recognized higher education institutions, as well as study results achieved in previous education or professional experience. When making a decision on the right of holders of documents certifying education obtained abroad to continue education in RTU study programs, RTU observes the principles of international recognition.
The target audience of the study program is applicants with an academic bachelor's degree in architecture or an equivalent education.

Programme code 47581 complies with Cabinet of Ministers Regulation No 322 Latvian Classification of Education. The first and second levels of classification, represented by the first two digits of code 47, are second level professional higher education (professional master's degree or fifth level professional qualification), to be implemented after obtaining a bachelor's, professional bachelor's degree or a fifth level professional qualification. The third, fourth and fifth levels of classification (thematic groups, subject areas and programme groups), denoted by the next three digits 581, are Architecture and urban planning (58 stands for Architecture and Civil Engineering).

Students are awarded the qualification of an Architect in accordance with the professional standard. Currently, the standard of the architect's profession (in Latvian) is in the process of coordination with the involved institutions.

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

The economic and social substantiation of the study programs is based on performed industry surveys, which are regularly performed on annual basis by the Ministry of Economics, and it is aimed at following up the development trends of the architecture and civil engineering field, including fluctuations in the increase of the construction and the indices of increase of the construction costs, in order to identify factors hindering development of the industry and eventual overheating risks in a timely manner, as well as forecasting the production scope and costs in the next years by applying forecasting methods. The survey reveals that during the whole period from 2020 to 2024 the experts and combined forecasts predict further increase of the industry costs. During the period from 2020 to 2022 this increase could be estimated within the a range of 1% to 5% per year, and in 2024 it could achieve 6%. According to the forecast the biggest increase of costs relates to labour costs where the combined forecast predicts a general increase of 8% to 10% per year over the period from 2020 to 2024. As regards sub-fields, in 2020 a decrease of the industry costs is predicted in the construction of residential and non-residential buildings, as well as in the construction of roads and highways. The most rapid increase is predicted in the construction of bridges and tunnels. An increase of costs in all the sub-fields is forecasted as from 2022 by the construction of bridges and tunnels leading with an annual increase of 5-7%.

The industry researchers have concluded that also defects and deficiencies in construction design documents and insufficient scope of preliminary studies present risks of increase of prices on the level of individual sites in the industry of architecture and civil engineering. In order to mitigate this risk, it is important to implement the building information modelling (BIM) system in Latvia as soon as possible, as it can considerably improve the quality of construction design documents, contribute to predictability of construction, optimise organisation of construction works and their sequential performance, reduce construction terms and improve efficiency of project management and supervision.

The architecture and civil engineering industry has experienced very fast development as from 2017. Its growth amounted to 19.4% in 2017 and to 21.9% in 2018; construction volumes increased in all the core groups of construction during the last year. Both availability of the EU funding and private investment encourage the industry growth. Attraction of employees in the industry has restarted since 2018, the number of employees was 74.6 thousand last year accounting for 30% increase compared to 2010, however, the pace of the growth was lagging behind that of the production growth. The wages of employees have increased considerably in the industry during the last two years and last year they amounted to 94.6% of the mean wage in the national economy.

There are 3 study programs within the sub-direction "**Architecture**", the academic Bachelor, Master and Doctoral program. The Bachelor and Master programs jointly provide designing skills and other theory and practical knowledge in related industries to students. The majority of graduates of the study direction work in regulated fields in the Republic of Latvia where the independent practice certificate can only be obtained by the persons possessing the professional Master level education.

The architect's education has been provided by RTU since 1869 and it has undergone substantial development and improvement, at the same time maintaining the local tradition and character, which can be observed best in the constructed environment. In Latvia the architect's education can also be acquired at the Business, Art and Technology University RISEBA in the Bachelor and Master study programs, and the education of the landscape architect is offered by the University of Agriculture of Latvia. In comparison to the architecture study programs of universities of other European countries, the architect's education at RTU is characterised by long-standing tradition and high quality, by ensuring succession of knowledge and experience, which is based on the balanced academic environment and staff to a large extent. In the Bachelor program students acquire the basic knowledge of architecture in Latvian. In comparison to other architecture study programs available in Latvia and abroad, the academic staff of the architecture program at RTU provide the set of theory and practical knowledge which is recognised in Europe and most appropriate for the Latvian situation.

Graduates of the study program about 90% of students continue to work in their internship places even after graduation.

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

During the reporting period, the study program demonstrated a stable ratio of enrolled students to the learning students. During the reporting period, 35 students enrolled in the study program on

average per year, and maintaining the state funded number of seats, practically all interested students were given an opportunity to get state funded seats. Every year the study program was educating 73 students on average. The study program was completed with diploma by 30 students a year on average. Such a number in general meets the needs of the labor market, and practically all program graduates have found jobs in profession. Drop-out rates was different each year, but during the reporting period generally only one student was extramatriculated due to academic underachievement. This shows high motivation in students and the ability to balance their study and internship load in order to complete the study program successfully.

Analysis of the student number dynamics in relation to the industry development trends, a steady number of students and growth are expected at the study program in the future.

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

3.2. The Content of Studies and Implementation Thereof

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

The study program includes the study courses advancing knowledge and skills in different fields of knowledge and art related to professional Master qualification in architecture **corresponding to one or more goals of the study program, which are coordinated with the results to be achieved.** Within the study program, students acquire comprehensive knowledge and skills for enhancement of professional competencies as well as gain competencies in application of the accumulated knowledge and skills in their practical work. The study program is designed in the way to let students acquire in full both theoretical and practical knowledge and skills during studies, as set by the requirements of the EU and RL regulations:

- Skill to develop construction projects meeting aesthetics and technical architectural requirements,
- Knowledge of history and theory of architecture and related arts, technologies and humanities, as well as awareness about the role of conservation and protection of cultural and historic environment;
- Skills in fine arts that affect the quality of architectural projects;

- Knowledge in urban and territorial planning, as well as in planning within the related industries;
- Understanding of the relationship between human being and buildings, as well as of the environmental context and the role of adequate scale;
- Understanding about an architect's job and their role for the society, in particular about the social factors;
- Awareness about research methods and data collection of architectural projects;
- Awareness about design of building constructions, the issues of civil engineering and technical engineering related to building construction projects;
- Knowledge about building physics and technologies that ensure comfortable indoor climate and protects indoors from effects of outside conditions in the context of sustainable development;
- Skill to design buildings according to requirements of customers and building users, following the limitations set in the regulations on building construction and construction costs;
- Knowledge about industries, institutions, conditions and procedures related to implementation of design concepts and cross-compliance of different levels of planning.

Development of modern spatial environment is a complex cross-disciplinary activity, when creation of a high quality sustainable and elastic living space for the society within the context of mitigation of the consequences of climate change is the most essential global challenge. The necessity for contemporary spatial solutions and, consequently, for specialists, is growing constantly, and higher educational establishments contribute decisively to it both by training young specialists for the economic sectors and by involving them in scientific research. With regard to the diversity of the issues of environment protection and climate change and solutions thereto, study programs in architecture will have to be focused on cross-disciplinary high education model in the future, whereas through integration of elements of humanities and artistic sciences, engineering sciences, as well as social sciences, competitive specialists are trained to work both locally and across the world, finding effective solutions for the issues pertaining to shaping our common future living space. The study program ensures comprehensive understanding about a human in the living space, their needs and tools, including the technologies that provide these needs, as well as about cross-disciplinarity of living space shaping solutions and skills in doing and evaluation of original research.

The study program ensures the relevance and compliance of the study program curriculum to the needs of the industry, labor market and the most recent scientific knowledge **regularly (at least once a semester) reviewing and analyzing the proposals of students, teachers and other involved parties. The study program is regularly improved, taking into account the recommendations and requirements of employers.**

An important role is given to practical and theoretical research. Students develop term papers and theses on the relevant topics, researching and analyzing scientific and professional literature in the libraries and international data bases. Students use the acquired knowledge and evidence both in their studies and in internship at Latvian or foreign companies, analyzing the living space shaping issues. Students present their research results at the annual RTU Student Scientific Conference and summarize in the Master Theses, which they publicly present upon completion of their studies.

3.2.2. In the case of master's and doctoral study programmes, specify and provide the justification as to whether the degrees are awarded in view of the developments and

findings in the field of science or artistic creation. In the case of a doctoral study programme, provide a description of the main research roadmaps and the impact of the study programme on research and other education levels (if applicable).

Awarding of a Master degree is based on the reviewed theoretical research – viva voce of a Master Thesis. Its topic must be connected with the latest knowledge in the field of architecture and architectural internship guidelines. Awarding of an architect's qualification is based on a reviewed diploma viva voce. Its topic and solutions must be in line with modern artistic and technical innovations in the field of architecture.

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

The study program is implemented bringing together acquisition of theoretical and practical knowledge and skills in the form of lectures, seminars and practical classes. The acquired study courses and elaboration of the graduation paper within the study program are proportionally distributed across the academic terms to let them complement each other most efficiently, targeting students at the acquisition of knowledge and skills. In general, the study program and planning of each academic term is done focusing on the acquisition and advancement of the theoretical and professional skills by each student, working both individually and as a team.

Assessment of learning outcomes is made according to the regulation on the assessment of learning outcomes (https://international.rtu.lv/wp-content/uploads/sites/65/2021/02/04.-Regulation_on_the_Assessment_of_Learning_Outcomes.docx.pdf). and regulations on the final examinations at Riga Technical University (https://international.rtu.lv/wp-content/uploads/sites/65/2021/02/08.-Regulation_on_Final_Examinations_at_RTU.pdf). The academic staff in charge of the study courses select the structure of elective study courses, lecturing and assessment methods according to the course curriculum and program specificities, as well as student needs. Courses and seminars about new educational methods are organized for the academic staff, they are also offered professional advancement and training courses at the faculty, RTU and international scale. RTU Centre for Academic Excellence organizes activities for the development of the academic staff on the university level.

The methods employed at the study program promote the achievement of the aims and outcomes of the study courses and the study program based on the student-centred principles of education. The study program owes its value to a professional dialogue between the academic staff and students, involving students in the improvement of the curricula and methods of the study courses. Students can take part in the improvement of the study process directly – expressing their aspirations to the academic staff of a certain study course, a department chair, the program

director, or through representatives of the student self-government, whose representatives are members of AF Council, RTU Senate and RTU Senate commissions, as well as members of RTU Academic Assembly. AF relationships with students are based on the principles of mutual confidence, respect and fairness. This imposes students both extra obligations and offers additional rights. Students have an opportunity to influence their learning process, to exercise their autonomy, to provide feedback on the study process, aligning it with their professional growth interests. The feedback between students, academic staff and program administration is greatly influenced by AF student self-government that takes an active part in all mentioned processes and makes the annual assessment of the academic staff.

At the beginning of each study course, the academic staff inform students about the study course acquisition requirements, including the recommendations of the students from the previous years, and familiarize students with specific evaluation criteria of the study course. They are published in the portal ORTUS. At least once per academic term, students evaluate the performance of the academic staff in ORTUS environment by answering the survey questions. These include evaluation of the study process, individual tasks, acquired skills, the academic staff's attitude and cooperation with the students. Survey questionnaires are anonymous. The program director regularly discusses current issues of the study process and quality, involving in these discussions other interested parties – vice-deans for studies and research, mobility coordinators, etc.

In order to ensure integration of the acquired knowledge, competencies and skills of the graduates, elaborating and implementing the study courses, a special focus is made on:

- Reflection of the topical case studies in the study program curriculum (at the level of lectures and practical classes), including analysis of real challenges and problems, faced and solved by the study program's partners within the curriculum of a particular study course;
- Integration and cross-disciplinarity of the study courses and the study program;
- Optimization of the curriculum in cooperation with external experts and visiting academic staff.

Individual studies play an important role. Description of the course of autonomous studies is included in the description of the study course as a mandatory part. Students' skill to learn individually is systematically developed within all the study courses. Students acquire skills of practical and research work by regular use of literature and internet resources, including international scientific databases, which are available at RTU Library with electronic access to ORTUS, to develop successful research papers, as well as Master Theses with an integrated diploma design project.

AF runs a transparent system promoting the development of the academic staff. Organizational units of RTU, including Personnel, Research, International Relations Departments, and the Centre for Academic Excellence regularly inform the academic staff about opportunities to advance their competencies in the field of scientific research, methodological and teaching skills, general competencies (foreign languages, information technologies, public speaking and presentation skills, etc.), and specific professional activities. ORTUS accumulates information about the scientific activities of the academic staff. To offer high-quality teaching, seminars on the teaching methodology are organized for academic staff of RTU, which address opportunities for the application of different study methods, experience and good practices.

AF regularly organizes seminars for the academic staff about the findings in the field of achieved learning outcomes, as well as about student-focused principles of education and implementation solutions. Such an approach is used in daily work – representatives of the academic staff constantly monitor the quality of learning outcomes based on the most recent knowledge in the sector and opinions of students. The Vice-Dean for Academic Affairs is the person in charge.

The academic staff of the study program regularly improve the study curricula by introducing yet more new learning organizational practices into the study process. Entering the single European architectural educational area allows both academic staff and students to be mobile and extend their knowledge and gain experience at the universities abroad, as well as provides wholesome work opportunities in a rapidly changing international labour environment. The study process integrates international experience, AF learning environment and infrastructure are adapted for the groups of students with various professional interests, maintaining the stable quality of studies.

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

The goal of internship and the tasks in the study program are harmonized with the set learning outcomes of the study program. The goal of internship is to enhance and develop professional on-the-job skills and competencies of the students – at architect's bureaus, state and municipal institutions, to strengthen and increase their knowledge according to professional requirements towards architects, to acquire the skill to be committed to work in an architect's team and to design construction projects meeting aesthetic and technical requirements, but prior to the internship at architect's bureaus to acquire up-to-date skills necessary for work in a design bureau during university internship. Internship is implemented according to a company's internship program. The trainee should get familiarized with the structure of the company, architect's bureau or administrative institution, should take part in design process. The internship topic shall comply with the specifics of a company, architect's bureau – urban planning, landscape architecture, 3D design, interior design, elaboration of building rehabilitation projects, administrative work activities. The topic is clarified upon the start of internship at the company, architect's bureau or administrative institution.

Internship for each student individually is supervised by the members of academic staff of AF Department of Architectural Design, responsible for the internship planning, organization and supervision (a coordinator) and an internship supervisor (representative of the company), who has professional architect's education and is a certified architect. During the internship, students can be advised and assisted in professional and organizational questions both at the university and at the place of internship. On-the-job internship for students is provided by AF or students choose their place of internship on their own and agree them with the internship coordinator at the faculty. **Students can choose an internship place outside Latvia, how to work in internship places where the working language is English or another foreign language.** AF, the company and the student sign a trilateral agreement, which stipulates obligations, rights and responsibilities of all the parties, student internship is approved by a resolution of AF Dean.

The internship viva is made in public, the evaluation committee includes representatives of faculties and building authorities and practicing certified architects from design companies.

The total volume of internship is 26 credit points, where 11 CP are used in the 2nd academic term

of the professional Master program and 15 CP – in the 3rd one.

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

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

Topics of the theses are chosen according to the needs of the industry. Research and diploma project in the Master Thesis are interconnected. Students have an opportunity to choose the field of research, the industry and the specialization of the thesis individually corresponding to their interests and after consultations with the academic staff. Topics of the theses in the fields of architecture addressed during studies are chosen in a relatively equal proportion – development of projects in territorial planning, landscaping, 3D design, interior design, building renovation, administrative work activities. Places of research and projects are located in different regions of Latvia and during the reporting period various projects also have been implemented abroad.

Every academic year there are theses focused on historic research and renovation of historical sites or building volumes. For example:

- Revitalization of Valmiermuiža (Valmiera Manor);
- Revitalization Opportunities of Vidzeme Historical Taverns: Vision of Bērzaune Parish Centre Development. Revitalization of Bērzaune Tavern, Latvia;
- Preservation Opportunities of Cultural Heritage: Revitalization of Majori Manor, Jurmala;
- Agenskalns Market Renovation in Riga;
- Renovation Problems of the Late 19th Century to the Early 20th Century Apartment Houses in the Historical Centre of Riga: Revitalization of Ozoliņš' House;
- Historic Airports Nowadays: Spilve Airport Museum;

Many students select their thesis themes related to urban planning issues and recent developments:

- Development of Kārlis Zāle Square Area in Liepaja;
- Vision of Sarkandaugava Industrial Territory Development;
- Revitalization of Industrial Waterfronts in The Urban Environment;
- Architecture in Conceptual Development of Transportation;
- Development of Military Heritage Territories;
- Vision of Riga Passenger Terminal Development;
- Regeneration of Dissonant Heritage: Initiative Centre in Brasa.

Such issues as urban environment and landscaping principles are also studied:

- Cēsu Space Centre in the Cultural Landscape of Cīrulīši;
- Revitalization Potential of Degraded Quarry Landscapes;
- Potential of Urban Nature Territories in Medical Rehabilitation Context: Rehabilitation

Environment by Jugla Lake in Riga;
- Potential of Lielupe and Driksna Waterfronts in Jelgava;
- Planning of Latvian Inland Public Waters and Their Waterfronts in the Context of Sustainable Development. Development of Lake Shores in the Centre of Alūksne.

Equally relevant is design of new building volumes, researching building typology, for example:

- Multifunctional Concert Hall in Riga,
- Daugava River Research Centre in Krasta Street, Riga,
- Contemporary Public Library Buildings as Multifunctional Social Centres: Jelgava Library,
- Sustainable Development of Student Housing. Torņakalns Student Quarter,
- Development of Sustainable High–Risers in the Context of the River Daugava Left Bank Silhouette in Riga. The High–Riser in Ķīpsala,
- Yachting Centre in the Western End of Kipsala in Riga,
- Architecture of World EXPO Pavilions: Latvian Pavilion for EXPO 2020, Dubai, OAE,
- Role of Community Centres in the Development of Urban Environment: Community Centre in Dobele,
- Design of Ogre Central Library Based on Timber Constructions.

Every year there are the theses based on innovative architectural solutions, for example:

- Tree Houses for Promotion of Nature-Based Tourism,
- Unmanned Aircraft Base,
- The Mountain Wildlife Exposition Centre,
- Space Research Station in an Extreme Martian Environment,
- Biophilic Design in Architecture of Medical Facilities: Psychosocial Rehabilitation Centre in Mežciems, Riga,
- Urban Gardening as a Sustainable Strategy of Residential Neighborhoods' Development in the Context of Neighborhood Loseter in Norway.

In certain cases, theses are based on real orders and their implementation. For example, "Design of Ogre Central Library using timber constructions" was a student's thesis, which was elaborated after design of a draft for municipality and at the moment the student is employed at the design bureau and involved in the project design and authorship supervision of Ogre Central Library.

Evaluations of the theses reflect student performance and the acquired knowledge and skills. 90% students complete the study program with grade "7" (well) or higher grades. 5% theses are graded 10 or excellent. Whereas every year the absolute majority of the theses received relatively high grades, excluding some theses, which received the grade "satisfactory" or lower. This shows insufficient ability to concentrate on studies in some students, which can be explained by their work load and general attitude to studies.

3.3. Resources and Provision of the Study Programme

3.3.1. Assessment of the compliance of the resources and provision (study provision, scientific support (if applicable), informative provision (including libraries), material and technical provision, and financial provision) with the conditions for the implementation of the study programme and the learning outcomes to be achieved by providing the

respective examples.

In order to implement the study program and to achieve the learning outcomes both the physical infrastructure, and academic and research facilities are evaluated and supplemented on the annual basis, including printed and digital publications. To ensure as high learning outcomes as possible, for the period of active studies each student is provided with a constant work place in the design workshop. It is equipped with all furniture and equipment necessary for architectural work, including the necessary utility connections. According to the volume of the program funding, resource and software renewal and upgrade is performed regularly.

In order to update the contents of the course literature, the academic staff of the faculty develops and updates regularly the learning aids (for development of certain courses and laboratory works). Students have RTU and AF data storages at their disposal:

- RTU Scientific Library repository of books and periodicals,
- Resources of the construction branch of RTU Scientific Library,
- Resource room with wide and relevant range of learning and specialized literature, regularly updated,
- Archive of learning aids – project design office.

Information repository funds are updated and renewed regularly with top scientific and professional journals or periodicals and books in the field.

The Faculty of Architecture also has its own library and resource room with new and historic books on architecture and architectural drawings, available in the faculty building. It stocks over 30,000 publications, including books, periodicals, landmark and unique folios, maps, architectural drawings, etc. It also stores student graduation papers, and their digitalized archive.

Scientific and artistic innovation events are financed from RTU Scientific Development Fund. For instance, the international conference “Koka dienas” (2017 –2019), Forum Wood Building Baltic and other events attended by students. Within these events, researchers and students have an opportunity to acquire new knowledge, share their experience and establish contacts in a view of new research and artistic innovation projects.

Students and teaching staff also have access to online databases provided by the RTU library.E-resources for the study programme “Architecture”:

- **E-books:** Proquest Central, Ebscohost eBook Academic Collection, SpringerLink, MasterFILE Reference eBook Collection.
- **E-journals:** Ebscohost Academic Search Complete, Wiley Online Library, Ebscohost MasterFile Premier, ScienceDirect (Elsevier).

More detailed information is given in Criteria 2.3.1.- 2.3.3. of Section 3 of Part II.

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

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

The source of funding for the study program is State funding is divided proportionally between payments and development expenses.
2017/2018 In the study year, the state funding was 22955 EUR. The cost per student within this study program was 7314 Eur.
2018/2019 in the study year was the state funding 287010 EUR and the cost per student within this study program was 7657 Eur.
2019/2020 in the study year state funding –331067 EUR Costs per student within this study program were 7974 Eur.
2020/2021 in the study year state funding - 461928 EUR. The cost per student within this study program was 8079 Eur.

Information on the minimum number of students in RTU study programmes is provided in the appendix of the self-evaluation report "On minimal number of students in study programmes".

Information on the funding distribution between the cost items is provided in the appendix of the self-assessment report "Funding distribution between the cost items".

Funding for the development of the study program is used centrally for the renewal of the scientific library fund, improvement and maintenance of shared auditoriums, public relations, program marketing activities, development and maintenance of information systems related to the study process, development of Ķīpsala complex and other activities. In addition, the available funding is also used for raising the qualification of teachers and exchanging experience, as well as for motivating students.

Tuition fees are determined in accordance with the remarks of the State Audit Office that tuition fees for students studying together with budget students may not be less than the state funding for this service. State funding is not granted for part-time extramural studies, therefore tuition fees are determined taking into account several factors, for example, to enable the program to cover its costs, market situation, demand for the study program, stage of development of the study program, etc.

3.4. Teaching Staff

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

learning outcomes.

Overall evaluation of the academic staff is given in sub-sections 3.5.-3.6. of the Study Field Report, Part II, Section 3 and the CVs of the academic staff members. Hereinafter the accent is put on qualifications and competencies of the academic staff involved in the implementation of the study program with the reference to specifics of particular study courses.

The qualification of the academic staff involved in the study program fully meet the study program requirements and regulations, ensure achievement of the goals of the study program and corresponding study courses and learning outcomes (see the CVs of the academic staff). The study program involves full-time RTU elected academic staff members, visiting lecturers and leading industry professionals. RTU elected academic staff is in charge of elaboration, curricula and update of the study courses. The responsible academic staff members are highly skilled professionals with the corresponding education and (or) professional experience. Implementation of the study courses involves a team of academic staff members, which can employ both full-time RTU academic staff members, industry professionals, and PhD students and visiting lecturers.

Academic staff of both Faculty of Architecture and other organizational units of RTU are involved in the implementation of the study program. There are 14 Doctors of Science, including 7 experts of the Latvian Scientific Council in Humanities and Arts, Engineering and technologies and other fields of knowledge. 7 elected RTU professors take part in study program implementation, their research and pedagogical qualification is in compliance with the criteria determined with regard to the research and pedagogical qualification of the candidates for the position of the professor stipulated in the norms and regulations. 3 of them are professors of the Faculty of Architecture.

Professor, Dr. arch. Jānis Krastiņš is an architect, Dr. habil. arch., Professor, Head of the Department of History and Theory of Architecture, Riga Technical University, member of the Latvian Association of Architects (1970), Full member of the Latvian Academy of Sciences (1994), President of the Latvian Academy of Regional Architecture (2019). Member of the editorial boards of many scientific editions, scientific councils and official advisory bodies. Professional awards: Camillo Sitte Fund Award (Austria, 1985), Jānis Baumanis Prize in Architecture (Latvia, 1989), Fulbright Prize (USA, 1994), Large Medal of the Latvian Academy of Sciences (1998), Medal of the Baltic Assembly (1998), Riga Prize (2002), Officer of the Order of Merit (Italy, 2004) and Senior Officer of the Cross of Recognition (Latvia, 2012), Large Culture Heritage Prize (Latvia, 2013), award from the Cabinet of Ministers (2016), diplomas of the Latvian Academy of Sciences for significant contribution to the Latvian science (2015 and 2018), Large Construction Industry Prize (Latvia, 2019), Honorary Member of ICOMOS (2020), etc. Prof. Krastiņš implemented a number of architectural projects and investigations of cultural monuments, the author of more than 710 scientific papers published in Austria, Belgium, Czechia, Denmark, Iceland, Italy, Estonia, Finland, France, Germany, Latvia, Lithuania, the Netherlands, Norway, Poland, Portugal, Russia, Slovenia, Spain, Sweden, Turkey, United Kingdom and the United States of America, including 30 books on various aspects of history and theory of architecture.

Professor, Dr. arch. Uģis Bratuškins is an architect and RTU Professor since 2012; Dean of the Faculty of Architecture since 2007. University lecturer at the study courses of Architectural Design, Interior Architecture, Morphology and Research of Architecture, Building Typology and others. Over 80 scientific publications. LCS expert in Music, Visual Art and Architecture, the branch of Humanities and Artistic Science, scientific expert at Slovenian Research Agency (since 2015) and Romualdo Delbjanko Foundation (Florence, Italy, since 2008). Vice-Rector of the Nordic Baltic Academy of Architecture (since 2013), Member of the editorial boards of scientific edition of Vilnius Gediminas

Technical University “Journal of Architecture and Urbanism” and scientific edition of Kaunas Technology University “Journal of Sustainable Architecture and Civil Engineering” (Lithuania), and scientific edition of the Latvian Academy of Agriculture “Landscape Architecture and Art” and Riga Technical University scientific journal “Architecture and Urban Planning”, as well as a reviewer of MDPI (Switzerland) scientific journals “Sustainability” and “Energies”. He also works in the editorial board of the professional journal “Latvijas Arhitektūra” and as an external consultant of the popular science journals “Ilustrētā Zinātne” and “Ilustrētā Pasaules Vēsture”. Participant of the State Culture Capital Foundation (SCCF) Committee for Architecture and Design (2013–2015 and since 2020) and takes part in the work of the Council for Conservation and Development of Riga Historic Centre as an advisor. Member and member of the board of the Latvian Association of Architects (since 1989).

Professor Dr.arch. Sandra Treija is an architect and an RTU Professor. Doctor of Architecture (since 2006). Professional on-the-job experience as an architect-planner and project manager at Urban Planning Unit of the City Development Department of Riga City Council (1997-2001). Academic experience at RTU Faculty of Architecture in different academic positions (since 1998), from an assistant to a professor (since 2012), as well as in administrative positions – Vice-Dean for Academic Affairs (2001-2006), Vice-Dean for Research (since 2007). Developed and lead 8 study courses on urban development and spatial environment related topics for the students in a variety of specialties. Member and member of the board of the Latvian Association of Architects. Expert at the Latvian Council of Science: the field of activity – Humanities and Social Sciences, Artistic sciences, including Architecture: architecture, urban planning, sustainable development, urban ecology, urban landscaping, living environment. Coordinator of Docomomo national group. S. Treija regularly speaks at international conferences, author and co-author of over 50 scientific publications. Member of the editorial boards of the scientific journals “Architecture and Urban Planning” (RTU) and “Landscape Architecture and Art” (LLU). Reviewer of MDPI (Switzerland) scientific journals “Sustainability” and “Energies”.

Sandra Treija has supervised the development and viva voce of 3 PhD theses and currently 4 more PhD theses are being developed under S. Treija’s scientific supervision. She has taken part in the international and national research projects, including the current ones – “Up-to-date Information Systems in Urban Regeneration”, Latvia-Lithuania-Taiwan Scientific Foundation; “Technological Solutions for Energy Efficiency of Buildings”, State Research Program; “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 concerned with sustainable urban development, housing problems, quality of living environment, urban regeneration issues.

Professional, academic and research activities provide a complex view of the current challenges in urban development, which in turn gives Professor the opportunity to address the latest theoretical and practical developments in the industry in the study process.

Assistant Professor, Dr. arch. Edgars Bondars is a member of the academic staff and a researcher at RTU Faculty of Architecture. Professional degree in architecture (2008), Master degree in Architecture (2009), Doctor of Architecture (2013) dealing with the topic “Spatial design in the context of bioclimatic factors”. Fields of research: bioclimatic design, energy efficiency strategies in architectural design. As an assistant, researcher or manager has taken part in 12 research projects, author of 23 various publications, including those in scientific and professional journals. Co-founder and member of the board of the architectural bureau RR.ES (since 2006), dealing with residential, public, and industrial building design. As an assistant or project designer has taken part in the development of at least 40 small and middle-scale architectural projects and draft projects.

Lecturer, Arch. mast., Ieva Miķelsone, is a member of the academic staff at RTU Faculty of Architecture. She publicly presented her Master Thesis on 4 March, 1993, with the title: "Perception of urban environment and the role of small architectural forms in its enhancement". Member of the Latvian Association of Architects from 1975 until now, architect certificate of practice No. 1- 00172, 28.11.2017. and No. 10-0036, 09.12.2013. Cooperation partners of the study courses: "Outdoor furniture", "Territorial improvement and transport", "Regional Landscape Architecture" – municipalities of Ogre, Ikšķile, Ķekava, Baldone and other regions, Sarkandaugava, Čiekurkalns development associations, the Ministry of Labour and Social Welfare, Riga Pardaugava Executive Directorate, etc. Member of the Latvian Academy of Agricultural and Forestry Sciences Thesis Evaluation Committee of the professional Bachelor program in Landscape Architecture and Planning, the report evaluation committee of RTU study program RAGAO student internship, the Council of RTU Faculty of Architecture and RTU Constitutional Assembly, the chair of the professional group of the Faculty of Architecture within RTU trade union staff committee. Field of professional activities: as a project manager and architect took part in the development of territorial planning, degraded environment revitalization projects and future visions, design of public and residential building construction and renovation projects, in renovation of historic parks and in design of nature parks for Latvian municipalities /Allaži, Sēja, Ineši, Stalbe, Jeri, Zvārde etc./.

Assistant Professor, Dr. arch. Ilmārs Dirveiks is a member of the academic staff at RTU Faculty of Architecture, Department of History and Theory of Architecture. Worked as a lecturer and assistant professor at the professional study program (2004-2015), but since 2015 has been an assistant professor. Professional degree in Architecture (1983), Master of Arts and Humanities (2003), Doctor of Architecture with the thesis "The Window onto Latvian Architecture" (2010). Art conservator and senior master of artistic research in architecture (2018). Lecturer at the Art Academy of Latvia (since 2016). Lecturer in arts at Daugavpils University (2012-2018). Expert of the Scientific Council of the State Inspection for Protection of Cultural Monuments (2008-2020). Riga Castle renovation board member (since 1995). Lecturer at cultural awareness workshops on the issues of conservation and renovation of historical buildings (since 1983). Lecturer at the international workshops and conferences. Author of approximately 40 publications, including those in scientific and professional journals. Since 2006, an architect at the research and design office "Arhitektoniskās izpētes grupa". Participated in project design for restoration and conservation of historical buildings. Fields of research: History and Theory of Architecture and Arts, Structures and Materials of Historic Buildings, Conceptual and Strategic Issues of Architectural Heritage Conservation. As a researcher and manager conducts artistic research in architecture, research in cultural history and construction history and provides expertise at typologically different sites of 13-20 centuries, such as Riga, Ventspils, Limbaži, Svēte, Lielstraupe Castles, Skaistkalnes Monastery, Nurmuiža, Šeppmuiža, Ungurmuiža, Kabile, Eleja, Valdgale, Nordeķu, Liepupe, Preiļu, Riebiņu, Varakļānu, Pope manors, etc., buildings, in Riga: ("Dannenstern" House, in 23 and 26 Mārstaļu Street, 21 Pils Street, 6 M.Pils Street, 16 Smilšu Street, 14 Alksnāju Street, 23 Elizabetes Street, "Jēkaba kazarmas" barracks etc.), Lestene church, Ķemeri sanatorium, buildings in Cēsis, Bauska, Liepāja, Kuldīga, Ventspils, and other Latvian towns. Architect-researcher within Riga St. Jackob's Cathedral renovation project (since 2014). Architect-researcher in Riga Castle research (since 1994).

Lecturer Sarmīte Barvika (Prof. Mag. Arch., MBA) is a researcher and lecturer at RTU Faculty of Architecture specializing in spatial planning and urban development modelling. Formerly, a lecturer at RTU Faculty of Engineering Economics and Management. Author of many publications, permanent referent at national and international conferences, expert in a variety of EU and national projects. Supervisor and reviewer of many Bachelor and Master theses. Visiting lecturer at Aalto University, Kaunas Aleksandras Stulginskis University and Tallinn University of Applied Sciences. Researcher within ERASMUS exchange program at the University at Buffalo (NY) and Vilnius

Gediminas Technical University. Scholarship holder of Lincoln Institute of Land Politics (2013, 2018). Associate member of IAAO (2012-2018), TAIEX expert, Baltic Open Solution Centre expert (2017-2018), URBAX 21 game presenter, member of the Latvian Association of Territory Planners. S. Barvika started her career in architecture specializing in conservation of architectural heritage, and later in GIS. She worked in the State Land Service and was one of the first managers of a large-scale municipal land evaluation project.

Selection of the academic staff members is based on their scientific and teaching experience, fields of research and achieved results with regard to specifics of the study program and study courses. The academic staff involved in the implementation of the study program conducts research through participation in international research projects and regularly publishes research results at internationally recognized publishing platforms. The academic staff are also given an opportunity to advance their professional competencies and extend international cooperation experience through the mobility program Erasmus+, COST or others, which promote the single European architectural educational area, and through the on-the-job training.

The responsible academic staff of the study courses also invite visiting lecturers (industry professionals, company managers) and PhD candidates. During the reporting period, in total 75 visiting members of academic staff from 22 countries have taken part in the implementation of the study program, including 8 visiting members of academic staff from 6 non-EU countries.

Apart from the Faculty of Architecture, other RTU organizational units also take part in the implementation of the study program.

In the category of compulsory study courses (Part A), many courses are implemented by organizational units of the Faculty of Civil Engineering, for example, the course “Indoor climate systems in architecture” is implemented by the Department of Heating Engineering and Technologies, the course “Building Constructions – Reinforced Concrete and Walls” – by the Department of Building Constructions, but the course “Architectural Acoustics” – by the Department of Civil Construction. The Department of Electrical Machinery and Apparatus of the Faculty of Electrical and Environmental Engineering is involved in the implementation of the course “Electrical Engineering for Architects”, whereas the Institute for Labor Protection and Civil Defense of the Faculty of the Faculty of Engineering Economics and Management implements the course “Basics of Environment Protection”.

In the category of the compulsory elective study courses (Part B), students are offered an opportunity to acquire a variety of professional specialization courses, the knowledge and skills they will acquire within these courses will be most useful in their architectural practice. These include the courses “Preservation of Historical Buildings”, “Regional Landscape Architecture”, “Interior Architecture” and “Integrated Urban Environmental Design”, implemented by organizational units of the Faculty of Architecture – the Department of Architectural Design and the Department of History and Theory of Architecture.

Internship takes a significant part of the study program, and is supervised by the Department of Architectural Design. Practicing architects who are not constantly employed by RTU are involved in evaluation of internship results.

In the category covering state examination (Part E), the development of a Master Thesis with an integrated diploma project is coordinated by the Department of Architecture, but specialists from other organizational units of the Faculty of Architecture and representatives of the industry can be invited as supervisors, consultants and reviewers. State Examination Committee mostly consists of the representatives of the industry from major professional bodies – the Latvian Association of Architects, the City Development Department of Riga City Council, National Cultural Heritage

Administration, as well as architect’s bureaus.

The academic staff of the study program regularly participates in professional training activities initiated by RTU organizational units, as well as in the seminars on the latest updates in the field of studies and research organized by the Faculty of Architecture. Activities that promote positive impact of the academic staff on the program quality and ensure relevance of the study program to the industry and regulatory requirements are organized on a regular basis.

The competence of the academic staff and industry professionals involved in the implementation of the study program allows effective delivery of necessary knowledge and skills to future architects, and comprehensive evaluation of the quality of the acquired knowledge.

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

The academic staff of various levels and professional qualifications are involved in the implementation of the study program to make the implementation of the study courses as high-quality and student-centered as possible. Altogether the implementation of the professional Master program involves over 20 members of the academic staff and visiting lecturers who advance their knowledge and competencies to improve the quality of studies, to optimize them according to the industry demand, to modernize and to digitalize program curriculum in order to provide students with up-to-date architectural education.

During the reporting period, 4 members of the academic staff were involved in the implementation of the study program, contributing to a range of research topics and extending an opportunity for the students to choose professionally industry and research fields appropriate for thesis supervision. The qualifications of the academic staff involved in the delivery of the program study courses meet the study program requirements. The program employs highly skilled researchers and industry professionals. Alongside full-time academic staff, part-time assistant professors and lecturers – practicing architects participate in the implementation of the study program, their number varies depending on the number of students in the corresponding academic term. To ensure an optimal student-academic staff ratio in the specialized subjects, the program employs 6 part-time members of the academic staff on average.

Wide age variation in the academic staff allows the most effective transmission of the experience accumulated over the generations of lecturers and teachers. Senior professors have a minimum work load and they are assisted by younger colleagues, as their presence and advice are very significant factors in the preservation of academic traditions of AF. Still renewal of the academic staff is one of the main tasks of each organizational unit manager and faculty management as a whole. The policies of the academic staff selection, renewal and training are based on regular involvement of Master students, graduated Masters and PhD students in the study process.

During the reporting period, the teaching staff in design classes has changed in order to expand the opportunities for cooperation with practicing architects. The composition of the bachelor's thesis defense commission has also changed in order to obtain a more objective assessment of students' theses.

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

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

The academic staff involved in the implementation of the study program takes part in scientific research and artistic innovation, systematically doing research in theory and history of architecture, protection of cultural monuments, urban and spatial planning.

Themes of theoretical works and practical tasks of the study programme are regularly précised and enhanced according to the latest developments in the industry. Research and creative work outcomes of the academic staff and personnel are published in scientific journals and conference proceedings, as well as displayed at architectural and art exhibitions. The faculty of architecture publishes the collection of articles *Arhitektūra un pilsētplānošana* (Architecture and Urban Planning) in the series of RTU scientific articles. Every year AF academic staff publish over 40 articles in different local and international scientific editions and present over 20 reports at local and international scientific conferences. The diversity of themes and genres demonstrates wide spectrum of interests that provide information and creative diversity of the training.

The fields of research addressed by the academic staff of architectural programs correspond to modern trends in the theory of architecture, protection of cultural heritage, evaluation of the impact of climate change on sustainable environment planning, linking urban development strategy to social processes and visual interpretation of spatial environment in design, including application of ICT in project design and planning.

The academic staff of architectural programs is involved in a variety of **research fields**:

- History of architecture in Latvia and urban planning in European cultural context (correlation of local architectural specifics to global trends, for example, the use of a traditional local material – timber – in modern architecture);
- “Discordant” heritage in Latvia (abandoned Soviet military sites, etc.);
- Perspectives of large-scale development of neighborhoods (large-scale neighborhoods take a significant share in the residential stock of Latvian towns, which makes their future perspectives a relevant research issue);

- Quality of residential houses in historical centers (a crucial issue due to the vast historical heritage and urgent need for preservation of dwelling functions in city centers, especially in Riga historical center);
- Identity and balanced development of urban environment (how to balance global development trends and needs for local heritage preservation, ensuring contemporary urban development, while preserving the local identity);
- Contemporary trends of urban horticulture (allotment gardens represent a traditional part of the Latvian cities, and their further role in urban renovation is to be evaluated in the context of regional and global processes);
- Urban development in flood prone areas (despite various threats and regulatory limitations, people wish to raise buildings in flood prone areas, which makes it necessary to create a research-based system for development of such territories).

The academic staff of the study program are implementing national and international research projects:

"**Up-to-date information systems in urban regeneration**", project of Latvia-Lithuania-Taiwan Scientific Cooperation Foundation, since 2020, team members: S. Treija, U. Bratuškins, A. Koroļova, Kaunas Technology University and TaiwanTech.

"The Identity of Architecture and Urban Environment of Riga in XX and XXI centuries" (State Research Program, 2012-2016), which determines the factors that form Riga architecture and urban identity, and promotes understanding of the most significant development trends in XX and XXI centuries. Project Manager: Prof. U. Bratuškins, team members - Prof. J. Krastiņš, Prof. S. Treija.

"The Big Reset on Neighborhood Design" (Erasmus+, 2014-2017). The project challenging the role of urban planners and designers, based on the idea that modern environment is not a statistic notion, but is rather a fluid concept opened for a variety of interpretations. The project plans to clarify whether the environment can be designed and planned. This assumption evokes the idea to work on collective space systems and facilities, improving their individual opportunities: network and multifunctional sites. Responsible academic staff: prof. U. Bratuškins, pract. assist. prof. E. Bērziņš.

VPP "Letonika" project "**Identification and Actualization of the Heritage of Latvian Art and Architecture**" (Project Manager Prof. Dr. habil. arch. J. Krastiņš).

OIKOnet A Global Multidisciplinary Network on Housing Research and Learning – LifeLong Learning Programme, Erasmus. Project Manager Prof. S. Treija, team members: Prof. U. Bratuškins, assist. prof. E. Bondars. Available at: http://www.oikonet.org/;

"**Improvement of Technological Solutions of Energy Efficiency of Buildings"** (State Research Program, 2018-2021). The project develops new technological solutions for improvement of energy efficiency of the existing building systems (heating, hot water, ventilation and air conditioning); nearly zero-energy buildings. It will be implemented based on different scientific research approaches and combinations: experimental research, real time measurements (in-situ), data collection, analysis and computer modelling. The project team has a vast experience in energy efficiency, for example, in development of new technologies, evaluation of energy consumption, analysis of energy saving, energy efficiency activities, energy management, energy efficiency policies, using of various approaches. The team consists of the certified energy auditors, architects, heating engineering, building doctors, chemists and modelling specialists. Academic staff involved - Prof. S.Treija, assist. prof. E. Bondars Available at:

https://videszinatne.rtu.lv/zinatne/projekti-un-petijumi/i-beet/

“European Middle Class Mass Housing COST Action CA18137” (COST Action, 2018-2022). The project is focused on the establishment of a trans-country network to unite European researchers who conduct research in the field of middle-class mass housing (MCMH) built in Europe since the 1950’s. In urban and architectural research, MCMH usually is evaluated as low, but comparative analysis and global perspective has not been shaped yet. When using different approaches, the main attention will be focused on architecture, urbanism, planning, state policies, history, sociology, which will result in new concepts and methodologies. It is planned to increase knowledge about the interaction of spatial forms, behavior and satisfaction and to integrate methods of architectural and social analysis. Academic staff involved - Prof. Sandra Treija.

Available at: https://www.cost.eu/actions/CA18137/#tabs|Name:overview

“Cities & Rail: Increasing Potentials for Smart & Just Cities” (Baltic Sea Cooperation Seed Funding**,** 2018-2019). The project aims to study how towns in the Baltic Sea Region can optimize and use a new investment potential in the railway network both related to sustainability and equality aspects of mobility. A lot of investments are channeled to the railway infrastructure around the Baltic Sea. We propose to investigate sustainability and equality aspects of these investments in cooperation with Swedish, Estonian and Latvian partners. While the project is led by academic institutions, it will involve important stakeholders, such as regional and municipal policy makers, regional and municipal transportation companies, urban planners and architects, as well as different social groups. Academic staff involved - Prof. U. Bratuškins, Prof. S. Treija, assist. prof. E. Bērziņš

Urban Allotment Gardens in European Cities – Future, Challenges and Lessons Learned – TUD COST (European Cooperation in Science and Technology) Action TU1201. Management team member Prof. S. Treija.

“**Implementing nature-based solutions for creating a resourceful circular city** COST CA17133” (COST Action, 2018-2022).

The project considers the problems of natural resource depletion, climate change and degradation of ecosystems faced by cities across the world, and these will continue growing if cities do not adapt to the situation. One of the elements in this transition is introduction of nature-based solutions (NBS). They can offer a range of ecosystem services beneficial for urban biosphere, for example, regulation of microclimate, flood prevention, water purification, provision of food and many others. Acceptance of the concept of circular economy bringing together different kinds of services and returning the resources back to the city would increase the benefits gained by cities. Involved academic staff and project team - A. Koroļova; Prof. Sandra Treija.

Available at: https://www.cost.eu/actions/CA17133/#tabs|Name:parties

Restructuring of Study Programme in Architecture to Long-cycle Integrated Master in Line with EU Standards, 530440-TEMPUS-1-2012-1-METEMPUS-JPCR. Project Manager Prof. U. Bratuškins, team members: Prof. S. Treija, assist. prof. A. Lapiņš.

Project L8431 “**Āra peldbaseinu izbūves iespēju analīze**” (Feasibility study of open-air pool construction), commissioner PLLC “Rīgas Siltums”, RTU AF, SGŪTI. 25.05.2017.–18.10.2017. (Project Manager assist. prof. E. Bondars, researcher S. Barvika).

In cooperation with LLC “Liepājas reģiona tūrisma informācijas birojs” lectures “Liepājas jūgendstils” (Liepaja Art Nouveau Architecture) within the courses for the tourist guides and preparation of exam questions (executor Prof. J. Krastiņš).

In cooperation with Vilnius Gediminas Technical University, review of the PhD Thesis by Matas Cirtautas "**Peculiarities of Urban Expansion in Lithuania**" (executor prof. U. Bratuškins). In cooperation with Ventspils municipality museum "Ventspils Muzejs", expert advice in the jury committee of draft design for a **draft design of a multifunctional building and landscaping in the Seaside Open-air Museum**, 2 Riņķu Street, Ventspils (executor Prof. J. Krastiņš).

In cooperation with Slovenian Research Agency (NM 88431452), **revision of scientific research projects** (executor Prof. J. Krastiņš).

In cooperation with Podkowa Leśna Centre for Culture and Citizen Activities (Poland), a conference report about the garden city festival "The **Mežaparks genesis and urban development**" (executor Prof. J. Krastiņš).

In cooperation with PLLC "DELFI", content shaping in terms of the State Cultural Capital Foundation project "**The cycle of multimedia educational lectures on the history of the Latvian culture**" (executor Prof. J. Krastiņš).

At the Art Academy of Latvia, revision of the PhD Thesis by Aleksandrs Bertašs **"Construction of Orthodox churches in Latvian and Estonian territories from the second half of 1840s to 1914"** (executor Prof. J. Krastiņš).

Publication of the book "**Jūgendstila arhitektūra Latvijā. Art Nouveau Architecture in Latvia**" by the publishing house "Madris" (executor Prof. J. Krastiņš).

The 14th international RTU Summer School "**The Big Reset on Neighborhood Design. Islands in the Stream**" Riga 26.07.2017.–05.08.2017. (in cooperation with Amsterdam Academy of Architecture, Netherlands, Weimar and Bauhaus University, Germany, Porto University, Portugal, Istanbul Academy of Culture, Turkey, and the Catholic University of Leuven, Belgium).

Exhibition "**Mežaparks – miasto ogród k Rygi" (Mežaparks – Garden City in Riga),** displayed during the festival of garden cities by Podkowa Leśna Centre for Culture and Citizen Activities in July, 2017 (executors Prof. J. Krastiņš, assist. prof. R. Čaupale).

Digitization of the Cultural Heritage of the Riga Art Nouveau Centre and Development of Virtual Museum" (EEA Financial Mechanism, 2013-2016). Art Nouveau heritage of Riga has not been sufficiently documented and made public. The goal of the project to digitalize Art Nouveau cultural heritage in the center and to make a virtual museum has been fully achieved. The digital data base with the information about 1000 items of Art Nouveau cultural heritage (photos of Art Nouveau artefacts and description of Art Nouveau cultural heritage artefacts) in Latvian, English and German) was created. Apart from the fields of architecture and history of art, experts were doing research in photography, applied arts and design, fashion, architecture and life style of Art Nouveau period to generate entries for the data base. Project Manager assist. prof. A. Tipāne, available at: https://eeagrants.org/project-portal/project/LV04-0005

16. **Meldere's** participation in the exhibition "Masked Ball" 16.06.–20.06. organized in the framework of Sigulda Opera Music Festival, Sigulda, Latvia, participation in the exhibition "Watercolor painting in Latvia. 19–21 centuries", at the exhibition hall "Arsenāls", Riga, Latvia; participation in the International Watercolor Painting Biennale "Baltic Bridges", Kaunas, Lithuania. **D. Baumane's** participation in the 9th International Fiber Art Biennale "From Lausanne to Beijing", Beijing, China; participation in the exhibition of the Association of Latvian Textile Art in St. Peter's Church, Riga, Latvia; participation in the exhibition of the Association of Latvian Textile Art at Minsk Museum of Contemporary Art, Belarus. **I. Nātriņas** participation in the exhibition "A Glimpse Ahead", New Approach Contemporary Medalic Art Research Center, Rack and Hamper Gallery. New York, USA; promotion award in the sketch

contest “K. Valdemāra pieminekļa (video site) izveide Ēdoles ciema dzirnavu dārzā” (Design of K. Valdemars’ monument in the mill garden of Ēdole Village); participation in the exhibition “Fauna medaļu mākslā” (Fauna in Medalcraft). Ģ. Elias Jelgava Museum of History and Art, Jelgava. **A. Beznosiks** gained the 1st prize in the IV Latvian Youth Olympic Competition in logotype design.

The interdisciplinary conference on wooden architecture **“Koka dienas” (Wood Days)** (Cooperation project since 2017) during the days of wooden architecture, craftmanship, industry and design in Cesis. The goal of the project is to demonstrate the existing woodworking technologies and to inform the society about advantages, prices and availability of wood constructions in Latvia. The international conference brings together Latvian, Estonian, Austrian, Finnish, Italian and British architects, manufacturers, designers, technical engineers, researchers and craftsmen. Inspiring timber stories are presented: design, art, know-how and craftmanship skills are joined together; questions are identified and problems are shaped, the solutions are sought. Staff in charge of the project**:** Prof. U. Bratuškins, Dr. arch. A. Viļuma.

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

Cooperation between the members of academic staff at the study program is maintained both during the semester delivering the study courses and planning the changes to the study program and its development for the coming semesters and within the study program in general.

In order to provide daily communications and promote cooperation, the appropriate environment has been established to let the academic staff members meet and maintain formal and informal communication, to promote improvement of the study courses and their mutual integration.

Updating of the study courses is made regularly based on both student suggestions and trends of industry development. During implementation of the study courses, regular meetings and curricular meetings of the academic staff take place, where they share their experience concerning the themes of the study courses, as well as elaborate and update the curricula, adopting themes, fields, responsibilities and regulatory requirements by mutual agreement.

The approval of study courses involves all academic staff working at a certain study course, thus ensuring that the themes within the study program are continuously enhanced and updated in cooperation with the involved industry professionals.

The study courses in the compulsory and compulsory elective parts are planned by thematic blocks. These blocks are cross-coordinated so that the study courses do not overlap and students are provided with the necessary basic knowledge in each field. Cooperation between the academic staff members at the study program is based on understanding of the thematic structure of the study program. Cooperation mechanisms are selected based on individual loads of the academic staff members, thematic interrelation of the study courses (consistency, continuity, complementarity), previous cooperation experience of the academic staff. Within the study program, cooperation of the academic staff members is organized so as to promote achievement of the learning outcomes. By reviewing and updating the study program, the members of academic staff mutually agree on

the most appropriate and effective solutions for evaluation of student achievements and achievement of performance indicators. Periodically discussing and reviewing the curricula of the study courses, thematically coordinated and complementary acquisition of the study program is ensured, topic overlapping at different courses within one study program is prevented.

Cooperation of the members of academic staff occurs withing a certain study course, in collaboration with responsible academic staff, PhD students, industry professionals, and between the study courses with related themes, where acquisition of similar themes is necessary at different levels of awareness (general, detailed, methods of application, etc.), as well as in the development of graduation papers – Master Theses with an integrated diploma project.

When planning the academic year and approving the tasks of the study course projects, the previously identified shortcomings are taken into account and corrections are made. Thus, one study course uniting all study courses related to the regulatory framework of construction and architecture resulted in the study course “Principles of Project Planning and Management” (academic staff member Sarmīte Barvika). Also, having evaluated the study courses of the preceding study level related to building physics, the curriculum of the study course “Indoor Climate Systems in Architecture” was updated.

The ratio of the number of students and lecturers within the study program is 1 lecturer for 8 students in practical classes and 1 lecturer for 35 students in lectures.

Annexes

III - Description of the Study Programme - 3.1. Indicators Describing the Study Programme		
Sample of the diploma and its supplement to be issued for completing the study programme	Arch_Mg_dipl_EN.zip	Arch_Mg_dipl_LV.zip
For academic study programmes - Opinion of the Council of Higher Education in accordance with Section 55, Paragraph two of the Law on Higher Education Institutions (if applicable)		
Compliance of the joint study programme with the provisions of the Law on Higher Education Institutions (table) (if applicable)		
Statistics on the students in the reporting period	Annex_5_Arch_RAGA_Statistics_EN.pdf	5pielikums_Arch_RAGA_Statistic_LV.pdf
III - Description of the Study Programme - 3.2. The Content of Studies and Implementation Thereof		
Compliance with the study programme with the State Education Standard	Annex_6_Mg_Arch_EN.pdf	6. pielikums_Mg_Arch_LV.pdf
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard or the requirements for professional qualification (if applicable)	Annex_7_profesional_standard_Architecture.pdf	7.pielikums_Arh_Mag_prof_standarts_LV.pdf
Compliance of the study programme with the specific regulatory framework applicable to the relevant field (if applicable)	Compliance the specific regulatory framework.pdf	Atbilstība specifiskajam normatīvajam regulējumam.pdf
Mapping of the study courses/ modules for the achievement of the learning outcomes of the study programme	RAGA0_Kartējums_ENg.xlsx	RAGA0_Kartējums_LV.xlsx
The curriculum of the study programme (for each type and form of the implementation of the study programme)	Annex_10_Mg_Arch_planning_EN.pdf	10. pielikums_Mg_Arhi_planojumus_LV.pdf
Descriptions of the study courses/ modules	RAGA.zip	RAGA_LV.zip
Description of the organisation of the internship of the students (if applicable)	12. Internship_Management_Procedure.pdf	12. Prakses_organizesanas_kartiba.pdf
III - Description of the Study Programme - 3.4. Teaching Staff		
Confirmation that the academic staff of the doctoral study programme includes not less than five doctors, of which at least three are experts approved by the Latvian Council of Science in the branch or sub-branch of science in which the study programme intends to award a scientific degree (if applicable)		
Confirmation that the academic staff of the academic study programme complies with the requirements specified in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions (if applicable)		

Geomatics (47581)

Study field	*Architecture and Construction*
ProcedureStudyProgram.Name	*Geomatics*
Education classification code	*47581*
Type of the study programme	*Professional master study programme*
Name of the study programme director	*Jānis*
Surname of the study programme director	*Kaminskis*
E-mail of the study programme director	*janis.kaminskis@rtu.lv*
Title of the study programme director	*Asoc. profesors/Dr.sc.ing.*
Phone of the study programme director	
Goal of the study programme	*• to provide students with a wide, professional, practically oriented education, which gives an opportunity to easily adapt to the labor market, as well as to carry out scientific research work;* *• to provide students with theoretical and practical training corresponding to the fifth level of professional qualification, which gives an opportunity to obtain the qualification of a civil engineer, as well as to continue education in doctoral studies;* *• to create an opportunity for students to obtain a qualification closely related to their future work, to provide opportunities for the acquisition of theoretical knowledge and skills that would allow graduates to start practical activities after completing the program, to perform the duties of a civil engineer in geomatics;* *• to ensure the acquisition of modern general knowledge, to develop economic and professional thinking, to promote students' analytical abilities, to develop skills in solving professional problems and tasks, to develop projects that would allow graduates to get involved in solving business problems;* *• to develop the ability to work in a team and work with professionals in various fields, to provide an opportunity to develop foreign language skills, which would ensure the ability to cooperate with colleagues from other countries.*

Tasks of the study programme	*to provide students with a wide range of professional, practice-oriented education, which gives an opportunity to easily adapt to the labor market, as well as to carry out scientific research work, as well as to continue education in doctoral studies;* *• to create an opportunity for students to obtain a qualification directly related to their future work, to provide opportunities for the acquisition of theoretical knowledge and skills that would allow graduates to start practical activities after graduation the program;* *• to master the techniques of scientific research in the main directions of geomatics;* *• to strengthen the ability to work with the latest tools and to expand the acquisition of specialized software;* *• to strengthen and expand the ability to connect theoretical knowledge with solving practical problems;* *• to acquire skills to perform pedagogical work in higher education institutions;* *• to develop the ability to work in a team and work with professionals in various fields, to provide an opportunity to develop foreign language skills, which would ensure the ability to cooperate with colleagues from other countries.*

Results of the study programme	*- is able to demonstrate the basic and specialized knowledge and critical understanding of the geomatics sub-sector of the field of construction science, moreover, part of the knowledge corresponds to the highest level of achievement in geomatics;* *- is able to show the understanding of the most important concepts and regularities of the geomatics sub-branch of the field of construction science;* *- is able to use the acquired theoretical foundations and skills to perform professional, innovative or research activities, to formulate and analytically describe information, problems and solutions in geomatics, to explain them and discuss them with arguments;* *- is able to work independently on their professional development, show a scientific approach to problem solving, take responsibility and initiative, working individually, in a team or leading other people, make decisions and find creative solutions in changing or uncertain working conditions;* *- is able to independently obtain, select and analyze information and use it, make decisions and solve problems, show that they understand professional ethics, evaluate the impact of their professional activities on the environment and society and participate in the development of the relevant professional field;* *- is able to demonstrate comprehensive knowledge of facts, theories and regularities necessary for personal growth and development, civic participation, social integration and further education;* *- is able to understand and demonstrate in detail a variety of specific facts, principles, processes and concepts in a particular field of study or professional activity in standard and non-standard situations;* *- knows specialized software, modern geodetic instruments, data processing methods;* *- is able to manage geodetic works related to the construction process; participates in the performance of specific works and may manage these works;* *- knows the certification procedures and requirements for surveyors and is able to take certification exams;* *- is able to process geodetic data in accordance with the specified requirements;* *- is able to use modern technologies to perform various tasks;* *- is able to independently solve more topical problems in the construction industry;* *- is able to defend and substantiate the results of research work;* *- is able to participate in national and international projects;* *- ensure effective communication and liaison with industry.*
Final examination upon the completion of the study programme	*Master Thesis* *Master Thesis Including Engineering Design Project*

Study programme forms

Full time studies - 1 years, 6 months - latvian

Study type and form	*Full time studies*
Duration in full years	*1*
Duration in month	*6*
Language	*latvian*
Amount (CP)	*60*
Admission requirements (in English)	*professional bachelor degree in geomatics or comparable education*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Professional Master Degree in Geomatics*
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, 6 months - latvian

Study type and form	*Full time studies*
Duration in full years	*2*
Duration in month	*6*
Language	*latvian*
Amount (CP)	*100*
Admission requirements (in English)	*bachelor's degree in engineering in geodesy, geomatics, geography, land management, forestry or geology, or an equivalent education.*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Professional Master Degree in Geomatics*
Qualification to be obtained (in english)	*civil engineer*

Places of implementation

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

3.1. Indicators Describing the Study Programme

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

Professional Master Study Programme "Geomatics", classification code 47581. Accredited by the decision of the Accreditation Commission of LR Ministry of Education and Science of 29 May, 2017 – accreditation certificate No. 2020/39.

The recommendations made for improvement of the study programme in the previous period have been taken into account and the following amendments have been made:

- Internship beyond the educational establishment is an integral part of professional programmes. RTU Senate Decision of 28 January 2019, Minutes No 626 "On the Approval of the Internship Organisation Procedure at Riga Technical University in a New Version". The assessment system used was introduced already in 2017 and approved by the RTU Senate at its meeting on 29 May 2017 as the "Regulation on the Assessment of Learning Outcomes". This was encouraged and developed by the RTU Student Parliament;
- The description of study courses includes the aim, the tasks and the learning outcomes. The supervision of academic staff in the course of studies is implemented in the form of tutorials;
- The content of internship has been developed by incorporating the learning outcomes that are relevant to the specific nature of the sector. A summative assessment is used;
- In accordance with RTU internal regulatory enactments, 20% of study programmes can be implemented in English.
- RTU has procedures developed for the recognition of previous non-formal education or professional experience.
- The quality assurance system is implemented in the study programme by reviewing the learning outcomes periodically (once a year) and in accordance with the industry innovations, improving the content of the study courses. The study programme administration performs observation of the study courses. The results obtained are discussed at meetings of the organisational units and the Industry Committee meetings.
- RTU has a common quality management system developed. Student semester survey and graduate survey are held. Employers participate as involved parties in the implementation of the study programme.
- Students, academic staff, graduates and employers representing stakeholders are involved in the development of the self-assessment report of the study programme.

On the basis of the decision of the Senate "On amendments to the parameters characterising the study programme of the study direction "Architecture and Construction"" the meeting of the Senate of RTU of 27 September 2021 (Protocol No. 653) approves amendments, the parameters characterising the professional master's study programme "Geomatics" (identification code BGE0), the programme, study:

- change the admission requirements for the first implementation option from 'professional bachelor's degree in geomatics, construction, transport or heat, gas and water technology, or

qualification of an engineer in geodesy and cartography' to 'professional bachelor's degree in geomatics or equivalent education';

- change the professional qualification to be obtained for the second implementation option from "geodesy and cartography engineer" to "civil engineer";
- change the admission requirements for the second option from 'professional bachelor's degree in geomatics, construction, transport or heat, gas and water technology, or qualification of an engineer in geodesy and cartography' to 'bachelor's degree of engineering in geedium, cartography, geomatics, geography, land survey, forestry or geology, or equivalent education'.

According to the column of the occupational map https://registri.visc.gov.lv/profizglitiba/dokumenti/nozkval/NKSK_buvnieciba.pdf (in Latvian) of the qualification structure of the construction industry “Land unit and determination of its use”, the qualification “civil engineer” is defined at LQF level 7, which is a continuation of LQF level 6 “geodesy and cartography engineer”. In the study program "Geomatics", the change of qualification from "Geodesy and Cartography Engineer" to "Civil Engineer" is necessary to avoid fragmentation in standards and the corresponding qualification level, as well as to help focus more on common tasks. In general, promoting a uniform and on common goals oriented level of qualification. This would also highlight common challenges in the industry, such as BIM (Building Information Modeling), BIS (Building Information System) and various innovative spatial solutions. A uniform qualification would also increase interest in geodesy, cartography and geomatics. This would attract a larger number of companies and/or other legal entities who will sooner or later have to use BIM and/or BIS. The tasks to be performed in the field are reflected in the BIM roads map - https://www.em.gov.lv/sites/em/files/bim20cela20karte1_1.pdf (in Latvian).

The way of implementing the program is only full-time and in Latvian. During the reporting period, other options have not been implemented and there have been no students.

During the reporting period, the implementation options in the professional master's study program have changed, because in this period no students were admitted to the part-time and part-time options and there was no interest in such implementation options, which shows that the available full-time option is relevant. for a modern student and it fully ensures the required number of students in the program and also provides quality study processes and knowledge of graduates.

During the reporting period, a new master's level study program "Innovative Solutions in Geomatics" was created, which is also intended for the flow of foreign students and is implemented only in English, thus ensuring that there are two master's degree programs in our field - English and Latvian. language is no longer implemented in the professional master's study program.

Implementation of the study programme offers full-time extramural studies. The study programme is implemented in Latvian, in Riga.

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

The professional master's study program "Geomatics" has been developed in accordance with the Law on Higher Education Institutions of the Republic of Latvia, in accordance with the Classification of Education of the Republic of Latvia and the Classification of Professions of the Republic of Latvia. The Department of Geomatics of the Institute of Transport Structures of Riga Technical University (RTU), Faculty of Civil Engineering (BIF) has close cooperation with professional associations - Latvian Surveyors Association (LMB), Latvian Association of Cartographers and Surveyors (LCGA), International Geodesy and Active members of the Geophysical Association (IUGG), the International Surveyors 'Association (FIG) and the International European Surveyors' Association (CLGE). The Department of Geomatics of the BIF Institute of Transport Structures is also a member of the Latvian GIS Society (LATGIS) and since 1999 has been an academic member of the International Society of Surveyors (FIG). Organizations have uniform requirements for the level of professional qualifications, and they are being introduced into master's degree programs in this field, thus creating a common level of education in geodesy, surveying and construction throughout the European Union. The aims and objectives of the Geomatics Program are in line with the professional requirements of these organizations in Europe and the world. The qualification to be obtained in the study program Geomatics is “Civil Engineer”. The qualification to be awarded according to the 2021 professional standard is a “civil engineer”. Link(in Latvian): https://registri.visc.gov.lv/profizglitiba/dokumenti/standarti/2017/PS-184.pdf Admission requirements have been changed for part-time studies, as they are not implemented due to the lack of interest of students in such an offer. Only full-time studies are possible.

Programme code 47581 complies with Cabinet of Ministers Regulation No 322 Latvian Classification of Education. The first and second levels of classification, represented by the first two digits of code 47, Second-level professional higher education (professional master's degree or level 5 professional qualification), awarded after obtaining a bachelor's degree, professional bachelor's degree or level 5 professional qualification. The third, fourth and fifth levels of classification (thematic groups, subject areas and programme groups), denoted by the next three digits 581, are Civil Engineering (58 stands for Architecture and Civil Engineering).

The Master's professional study program is aimed at preparing specialists in the field of geomatics, with extensive competencies in engineering issues, for work in companies of various industries and public administration institutions. The acquisition of skills and knowledge envisaged in the study program is ensured by the European level academic and scientific staff (EU and Latvian experts in the field of technical sciences), who are involved in the provision of national and European level engineering solutions on a daily basis.

The professional master's study program "Geomatics" is unique in Latvia, there is no analogous program in the European Union (EU) education area, there are only a small number of similar programs and we believe that the competitiveness of the graduates of the program is very high. The title of the study program, the degree to be obtained, the professional qualification, the aims and tasks of the study program, as well as the study results to be achieved and the admission requirements are mutually agreed and appropriate. Measurements of the results of the tasks are students' study results, independently developed master's thesis with significant theoretical significance and features of practical use, which includes original research results, demonstrates competencies to independently obtain, select and analyze information and use it to solve problems in geomatics and construction. The professional master's degree in geomatics with the qualification of a civil engineer is awarded after passing the theoretical subjects, completing the practice tasks and defending the master's thesis in the State Examination Commission. The multisectoral approach used in the implementation of the study program allows students to practically apply the knowledge gained in the theoretical parts of the lessons to the analysis and solution of specific practical problems, which allows students to integrate into the real work environment to the

maximum. The implementation of the study program is focused on the use of innovative technologies and their comprehensive assessment for sustainable economic development. In the Master's professional study program "Geomatics", the results of students' knowledge assessment are discussed twice a year at the meetings of the Council of the Institute of Transport Structures. The results are also compiled and evaluated by the program administration, and they serve as a basis for further improvement of the study process. The commission for the defense of final theses gives its opinion on the quality of master's theses and their defense, which submits a report to the study program administration with recommendations on the defended master's theses.

As a result of mastering the study program, the graduate:

• is able to show the basic and specialized knowledge characteristic of the geomatics sub-sector of the field of construction science and a critical understanding of this knowledge, moreover, part of the knowledge corresponds to the highest level of achievement in geomatics;

• is able to show the understanding of the most important concepts and regularities for the geomatics sub-branch of the field of construction science;

• is able to use the acquired theoretical foundations and skills to perform professional, innovative or research activities, to formulate and analytically describe information, problems and solutions in geomatics, to explain them and discuss them with arguments; • is able to work independently on their professional development, show a scientific approach to problem solving, take responsibility and initiative, working individually, in a team or leading other people's work, making decisions and finding creative solutions to changing or uncertain working conditions;

• is able to independently obtain, select and analyze information and use it, make decisions and solve problems, show that they understand professional ethics, evaluate the impact of their professional activities on the environment and society and participate in the development of the relevant professional field;

• is able to demonstrate a comprehensive knowledge of facts, theories and regularities necessary for personal growth and development, civic participation, social integration and further education;

• is able to understand in detail and demonstrate a variety of specific facts, principles, processes and concepts in a particular field of study or professional activity in standard and non-standard situations;

• knows specialized software, modern geodetic instruments, data processing methods; - is able to manage geodetic works related to the construction process; participates in the performance of specific works and may manage these works; - knows the certification procedures and requirements for surveyors and is able to take certification exams;

• is able to process geodetic data in accordance with the specified requirements;

• is able to use modern technologies to perform various tasks;

• is able to independently solve more topical problems in the construction industry;

• is able to defend and substantiate the results of research work;

• is able to participate in national and international projects;

• ensure effective communication and interaction with industry.

The study program is professional, therefore there are constant study tours and exchange of practical experience in companies, practical study works in order to improve students' skills and competencies in accordance with the defined results of the study program.

There are 2 implementation options in the study program, which depends on the students' previous knowledge and professional qualifications. In order to ensure compliance with the goals of the program and fulfill the tasks to be achieved, students without a previous professional qualification are provided with appropriate practice in the field. The specifics of the work in the field are introduced, professional skills and abilities are acquired. This is also the main difference in the implementation of these 2 options and there are no differences in the teaching methods used. Guided by the study courses in the program, students choose and acquire limited choice study courses in accordance with the uniform requirements in the program.

Through its activities, the program promotes the guiding principle defined in the Strategy of Riga Technical University (RTU) for 2021–2025: RTU_strategija_2021_2025_gadam_lv.pdf (in Latvian)

“High quality and efficiency - proactive connection of RTU activities with the needs of the national economy. RTU is one of the leading universities of science and technology in the Baltic and Nordic region, based on a study system developed in research, innovation and cooperation with industry. RTU prepares European and world-class engineers - leaders: developers of new technologies” implementation in life. The study program fully complies with the development goal of RTU Faculty of Civil Engineering - to become the leading internationally recognized study, science and innovation institution in Latvia in the field of construction geodesy, geomatics, ensuring high quality study process, internationally recognized scientific research and sustainable innovation, commercialization and knowledge transfer.

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

The professional master's study program "Geomatics" prepares highly qualified specialists in -civil engineering specialties-in the state regulated professions.

EuroGeographics Association, the Board of Surveyors The Council of European Geodetic Surveyors (CLGE) and Geometer Europas (GE) in order to raise the prestige of the surveyors profession and to assess the need for such professionals, conducted a study which showed that the labor market has a great demand for highly-qualified geoeducated staff, but, at the same time, requires a lot of effort at both national and European level in order to be prepare the best qualified professionals able to collect, process, analyze, and present spatial data and to apply innovative technologies and data processing techniques http://ec.europa.eu/social/main.jsp catId=738&langId=en&pubId=7267&type=2&furtherPubs=yes and http://ec.europa.eu/social/main.jsp?catId=955&langId=en. Various spatial data sets are increasingly being used for decision-making, process modeling, and other purposes. The study shows that there is a very noticeable gap between labor market demand and supply of specialists and institutions of higher education study programs.

An international experience developed throughout the studies open up good opportunities to apply the mastered knowledge and skills in Lithuania, Latvia and other EU member states and to be employed by multidisciplinary companies and organizations involved in the supply of consulting, planning and design services or different kinds of surveying or GIS applications. Graduates of common Master programme would be specialists in demand at the State Land Service of Latvia. The State Land Service (hereinafter - “SLS”) is a governmental institution of the Republic of Latvia which was established in 1992 to implement land reform. SLS is in charge of real property object data accumulation and dissemination to institutions responsible for land management and

supervision. Also graduates would be very welcome at the Latvian Geospatial Information Agency (LGIA), which is one of the leading institutions in the realizing of the national policy in the field of geodesy, cartography and geospatial information. Pursuant to the competence the LGIA cooperates with state and local authorities, with the NATO member states, with European Union institutions and competent international organizations, as well as provides to these organizations and to the public geodetic, cartographic and geospatial information. As well our graduates work at the Rural Support Service (RSS), which is state administration institution and operates under the supervision of the Ministry of Agriculture in accordance with the Law on Rural Support Service. The Rural Support Service is responsible for implementation of a unified state and EU support policy in the sector of agriculture, forestry, fisheries and rural development; it supervises compliance of the sector with the laws and regulations and fulfils other functions connected with agriculture and implementation of rural support policy. Besides that our graduates work at Latvian State Forest service, Maritime Administration of Latvia, State Joint Stock Company Latvijas Gaisa Satiksme (LGS), which provides to the users optimum Air Navigation Services in Riga Flight Information region, etc.

The professional study program for graduates of the Master's program in Geomatics is available for further doctoral (PhD) studies.

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

During the reporting period, **the Professional Master Study Programme “Geomatics”** was implemented in Latvian on a full-time basis.

Number of students:

In academic year 2015/2015, comparing to 2014/2015, the number of students increased, forming a growth by 12 students or 30%. In 2016/2016, the number of students, comparing to the previous academic year, continued increasing. This growth made 20%. In academic year 2017/2017, the number of students, comparing to 2016/2017, decreased by 28%, whereas in the next academic year the number of students grew by 2.5%. In academic year 2019/2020, comparing to 2018/2019, a growth by 7% was observed. In academic year 2020/2021, as a result of the COVID-19 pandemic, the number of students in the Master studies decreased by 10%.

This is due to both demographics and the overall decline in student numbers in the country, but despite fluctuations in the number of students, the number of state budget seats in the programme has not actually increased over these 6 years.

All Master students have chosen full-time studies. This is confirmed by the fact that there are no part-time students, even though their admission was announced. Consequently, it was decided not to announce admission to part-time studies.

Breakdown by the source of funding:

The analysis allows concluding that there are no tuition fee paying students. All students of the study programme study for state budget funding. When surveying students, it was found out that if it were not possible to receive a state budget seat, students would not choose these studies

because it was not possible to cover the tuition fee in the current economic situation, particularly for those students coming from the regions. Some of the potential learners have been affected by the global pandemic.

Drop-out:

The main reasons for drop-out:

- failure to pass the study courses, due to academic failure;
- understand that the sector selected does not meet their expectations,
- students drop out of higher education institution due to social causes/family conditions;
- due to financial reasons,
- due to the epidemiological situation which affected the study process of the last semester; students admitted that they were unable to fully adapt to remote studies and were unable to complete study courses on time.

Full-time students of the study programme are offered an opportunity to take part in the international student exchange programme Erasmus+.

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

3.2. The Content of Studies and Implementation Thereof

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

The Professional Master Study Programme "Geomatics" is in line with

the trends in the sub-fields of geodesy, geoinformatics of the field of civil engineering in the EU and worldwide.

Volume of the study program (CP): **Option 1 60CP**

Duration of the study program 1.5 years full-time studies after obtaining a professional bachelor's degree or equivalent studies.

Parts of the programs and their scope (compulsory, limited choice, optional), including the amount

of the final work:

General education study courses - 7 CP;

professional specialization study courses - 25 CP;

pedagogy and psychology study courses - 2 CP;

Optional study courses - not provided.

Among them:

Study courses that provide in-depth acquisition of the latest achievements in the theory and practice of geomatics - 7 CP;

research work, creative work, design work and management study courses - 9 CP

Practice - 6 CP

Option 2 100CP

Duration of the study program is 2.5 years of full-time study after obtaining a bachelor's degree or equivalent. Parts of the programs and their scope (compulsory, limited choice, optional), including the amount of the final work:

General education study courses - 14 CP;

professional specialization study courses - 28 CP;

pedagogy and psychology study courses - 2 CP;

Optional study courses - not provided.

Among them: Study courses that provide in-depth acquisition of the latest achievements in the theory and practice of geomatics - 11 CP; research work, creative work, design work and management study courses - 10 CP.

Practice - 32 CP.

The Department of Geomatics of the Institute of Transportation Engineering, Faculty of Civil Engineering (FCE), Riga Technical University (RTU) maintains close cooperation with the professional associations – the Latvian Association of Land Surveyors, Latvian Association of Cartographers and Geodesists, active participants of the international organisations (associations) - the International Union of Geodesy and Geophysics (IUGG), International Federation of Surveyors (FIG) and Council of European Geodetic Surveyors (CLGE), and the member of Latvian Geospatial Information Technology Conference (LATGIS), which is a member of European Umbrella Organisation for Geographic Information. The aims and tasks of the study programme are coordinated with the guidelines set by these organisations with regard to common professional requirements in the world and in Europe. RTU FCE Department of Geomatics of the Institute of Transportation Engineering is an academic member of the International Federation of Surveyors (FIG) since 1999.

These organisations set forth uniform professional qualification requirements, which are incorporated in the study programmes in this field across in the EU. The aims and tasks of the study programme “Geodesy” are in line with the uniform professional requirements in Europe and worldwide.

The future vision of the professional Master study programme “Geomatics” is pursued in the light of the views of students, employers, professional organisations and regional interests; it is in line with

the RTU mission and vision, goals and objectives.

A person operating in the field of geomatics – geodesy, cartography and land management – must be competent in all professional matters related to the processing, analysis and interpretation of all types of measuring, geospatial data, according to the initially given or specified assignment.

The study programme “Geomatics” is a programme open to cooperation that takes into account the goals and objectives of higher education, as well as regional and national interests related to the needs of students and employers.

Each year in October, the study programme administration submits a report to the boards of the professional associations involved regarding the study programme, its study courses and their content. When required and following assessments of the industry experts, additions and changes are introduced to the content of study courses in compliance with the industry and labour market development tendencies.

Each member of the academic staff involved in the programme has a sufficient and up-to-date number of scientific publications on the subject of the lectured course.

Since the previous accreditation, the content of the study programme has been updated to be topical, complementary, consistent with the goals of the programme and ensuring achievement of the learning outcomes, as well as to correspond to the needs of our industry and the latest scientific trends and innovative practical solutions.

In academic year 2014/2015, the content of the study programme was improved in line with contemporary trends and requirements of occupational standards. In line with the new version of the state standard and the decision of the RTU Senate meeting of 23 March 2015 on “Joint Requirements to Study Programmes of Riga Technical University”, improvements in the structure of the study programme were made in cooperation with representatives of employers and programme advisers, supplementing it with new study courses, as well as making substantive changes to study courses, in order to ensure their compliance with the market demands and the requirements of the occupational standard.

The content of the study programme is improved in cooperation with the professional organisations of the industry – Latvian Association of Surveyors, Latvian Association of Cartographers and Geodesists, so that students could acquire comprehensive knowledge in the fields related to geomatics, to be able to use it in practice, to be competent in analysing information independently, taking decisions and understanding professional ethics. The programme provides students with professional knowledge in respective fields of specialisation, educating and training comprehensive and professional specialists in the industry. Each academic year has 2 semesters, each semester lasts 20 weeks – 16 study weeks and 4-week examination period. Riga Technical University is state-founded derived public person with the right for self-government. Its development strategy determines the role of the University as a higher education and research institution in the society, its mission, vision, goals and objectives. When elaborating the Development Strategy of RTU, being aware of the role of the University in the growth of the Baltic Sea region and the development of Latvia’s future, the priorities of the European Union have been observed, as well as the guidelines of the education and innovation policy planning documents at the national and regional levels.

The study programme is in line with the basic premise of the Strategy and Development Programme of Riga Technical University (RTU) for 2021-2025: To ensure implementation of the leitmotif of the National Development Plan 2021-2027. RTU positions itself as one of the cornerstones of the development of Latvia, which educates and trains the specialists necessary for the necessary national economy of Latvia, as well as development of goods and services, providing the basis for sustainable development of Latvia. RTU Strategy includes essential principles for RTU

development in the period until 2025, as well as determines the activities to be performed and authority sharing in their completion.

In order to accomplish RTU vision until 2025 - to become one of the leading universities of science and innovation in the Baltics, three aims of the University are defined in the Strategy – high-quality higher education, excellence in research, sustainable innovation and valorisation. Definite performance indicators are set for these aims. Successful implementation of the development strategy of RTU forms the basis for creation of knowledge-based society in Latvia. RTU is one of the most significant partners in achieving the strategic goal of the Latvian National Development Plan – education and knowledge for growth of the national economy and technological excellence. RTU mission is to ensure internationally competitive high quality scientific research, tertiary education, technology transfer and innovation for Latvian national economy and the society.

The aim of the high-quality study process is to ensure prestigious, internationally recognised high-quality studies that train internationally competitive, analytical and creative specialists who ensure growth of Latvian national economy and who are able to participate in lifelong learning. The aim of excellent research is high quality scientific research to match the demand of Latvian national economy and international economy, with comprehensive involvement into international, state and field research programmes and integrated in the study process. The aim of sustainable valorisation is efficient technology transfer and innovation development environment to promote creation of new technology businesses and products.

At the regional level in Latvia, in order to meet the requirements of the Energy Charter, there are also specific opportunities determined for qualification upgrade (lectures and seminars), in which the topics have been adapted to these requirements, as demonstrated by the joint cooperation with the Ministry of Economics and the Ministry of Environmental Protection and Regional Development of the Republic of Latvia during the period of 2009-2014, within the framework of which lecturers are both representatives of the aforementioned ministries and foreign specialists.

Thus, for instance, in April-March 2014, guest lectures were held for both students and academic staff on construction, renovation and reconstruction topical issues in the EU conducted by Andrzej Czemplik from Wrocław University of Technology.

At the same time, in February 2016, a seminar “Construction Law and Cabinet Binding Regulations” was organised to help students in the development of their graduation papers.

The study process is organised in such a way that the themes of student study projects and research papers include issues relevant to the sector. The study programme is being supplemented and updated in the course of its implementation on the basis of labour market studies and consultations with employers and practitioners. In September 2017, all students took part in a fascinating guest lecture “Near-field Spacecraft VLBI Tracking in the Context of Space Geodesy” delivered by Professor Leonid Gurvits from Delf University of Technology, the Netherlands. In November 2019, RTU Department of Geomatics organised a seminar-discussion “2D-3D-4D GIS” held within the framework of the International GIS Day. A possibility of participating in the event was provided to the students, academic staff, and stakeholders. The seminar speakers were representatives of GIS companies, recognised in Latvia and internationally, who spoke about the possibilities of various dimensions in the GIS environment and their contribution to different sectors. In the discussions part, these and other representatives from the academic environment and the Latvian GIS Association (LATGIS) could be heard answering questions of interest to the participants about the opportunities and development of GIS.

On 24 May 2019, an erudition contest “Geomatics Competition” was organised for the study programme students. The goal of the contest was to provide students with an opportunity to

demonstrate their knowledge, skills and inventiveness through competition, as well as to consolidate knowledge, understanding and conviction regarding application of their geomatic knowledge, and to build teamwork, friendly competition among students and cooperation with the academic staff. The erudition contest included theoretical and practical tasks in the field of geomatics that encompassed mathematics, astronomy, cartography, geophysics, geodesy, land surveying, remote sensing, GIS, photogrammetry, as well as general issues on the geomatic sector related to its history.

In November 2020, within the framework of the International GIS Day, a seminar and discussions were organised at RTU Department of Geomatics, this time remotely, devoted to academic and professional development of GIS in Latvia. The event aimed at educating both the students of the study programme “Geomatics” and students of other fields about how geographic information systems had come to our society, how long Latvian specialists had been engaged in GIS, how much they had achieved and what opportunities they could see in the future. This time representatives of several Latvian universities were invited to the seminar to talk about GIS growth during the period since it came to Latvia, what projects had been performed and what new heights they would like to achieve in this field. In the discussion part, the universities and the representatives of the Latvian Association of Surveyors considered the role of GIS for the specialists operating in the geomatics sector, evaluated benefits of GIS and explained why it should be learned.

Guest lecturers from different Latvian enterprises also regularly participate in the study process. To deliver some study courses, apart from the academic staff, professionals of the industry are attracted, for example, a practical part of the study course “Fundamentals of Geomatics” was conducted by representatives of Ltd. Metrum or Ltd. GeoStar; the study courses “Cartography” and “Geographical Information Systems” were delivered by representatives of Ltd. SunGIS and Ltd. Envirotech; some courses reated to geodesy were delivered by representatives of Ltd. GPS partners, Ltd. GeoStar and other employers related to the field of geomatics.

Students have an opportunity to visit enterprises of the industry and scientific institutes for the study purposes.

During the annual field trips organised by Assoc. Professor J. Kaminskis to the Institute of Astronomy in the Botanical Garden (Riga), students have an opportunity to get familiar with the brightest scientific pioneer, laser technology (SLR) and time measurement tools in Latvia and the world. There is also the exact point or benchmark of the state gravity of the Republic of Latvia.

Students regularly present their research results at student scientific and technical conferences. In 2015/2016 academic year, students participated in the 57th Student Scientific and Technical Conference of RTU, presenting their research results in improvement of geomatics. In 2016/2017 academic year, students of the programme participated in the 58th Student Scientific and Technical Conference of RTU with presentations related to the selected field of studies. The scientific head of the section was Dr.sc.ing., Assoc. Prof. Jānis Kaminskis and the Scientific Committee consisted of Dr.sc.ing., Assoc. Prof. Māris Kaļinka, Dr.sc.ing., Assoc. Prof. Jānis Zvirgzds, Dr.oec., Assoc. Prof. Armands Auziņš, Dr.sc.ing., Prof. Eimuntas Paršeliunas, Dr.ing., Assist. Prof. Jūratė Sužiedelytė Visockiene.

In academic year 2017/2018, the tradition was continued, when the programme students participated in the 59th Student Scientific and Technical Conference of RTU with presentations related to the selected field of studies and the respective study courses. Master students had 8 presentations on the challenging issues for the industry. Students of the study programme regularly receive awards for best presentations. This tradition continues in every year of study. In 2020/2021 academic year, students participated in the 62nd Student Scientific and Technical Conference of RTU. Mission of the professional Master study programme “Geomatics” is to provide the Latvian

economy and society with internationally competitive high-quality scientific research, higher education, technology and innovation transfer, as well as educate and train high-quality specialists in the field of geomatics that are in high demand and competitive on the international labour market.

RTU vision: Riga Technical University – a modern and prestigious University, internationally recognised as the leading University of science and innovation in Europe – a cornerstone of the development of Latvia. Vision of the professional Master study programme "Geomatics": The possibility for everyone to provide the required geospatial measurements based on professional knowledge of technologies from the ground and from space, as well as analysis and visualization of their complexes, ensuring high quality training and growth of Latvian and foreign specialists; regularly, together with state institutions and entrepreneurs, to resolve issues related to geomatics, promoting their development. The vision of RTU: Riga Technical University is a modern and prestigious internationally acknowledged university as a European centre of studies, scientific research and innovations – a cornerstone of Latvia's development.

The Development Strategy of RTU serves as a basis for elaborating the University development programme and drawing up the investment plan of the annual strategic development projects, which are implemented using the budget of Riga Technical University and the attracted funds – financing from the State, European Union structural funds or other financial resources. Implementation of the investment plan ensures achievement of the objectives set in the strategy. RTU Senate approves the procedure for monitoring the process of introduction of the Development Strategy and supplements or amendments are introduced. Monitoring the Development Strategy and the results-oriented management system motivates departments and employees to achieve the objectives set out in the Development Strategy.

The future vision of the professional Master study programme "Geomatics" is implemented with account of the opinion of students, employers and professional organisations, regional interests and in compliance with the RTU mission and vision, goals and objectives. The study programme "Geomatics" is open for cooperation, taking into account the goals and objectives of higher education, as well as regional and national interests related to the needs of students and employers.

RTU development is planned regularly, including an integrated perspective financial programme, guaranteeing the achievement of the aims of the programme and management of possible risks, including demographic ones. There is a development programme, together with a concrete action plan aimed at ensuring sustainability, both at RTU as a whole and in the relevant field of studies.

Representatives of employers regularly participate in the State Examination Commission of the Department of Geomatics to provide an assessment of the knowledge acquired by students of the study programme. By participating in the State Examination Commission, industry representatives are able to make their proposals on the desired themes of students' research that are topical in the labour market and are taken into account in other years of study. Elaborating the Development Strategy of RTU, recognising the role of the university in the growth of the Baltic Sea region and the development of Latvia's future, priorities of the European Union are observed, as well as the guidelines of the education and innovation policy planning documents at the national and regional level.

Successful implementation of the Development Strategy of RTU is the basis for building a knowledge-based Latvian society and RTU is one of the most important partners for achieving the strategic goal set out in the Latvian National Development Plan – education and knowledge for economic growth and technological excellence.

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

The goals of the master's professional study program "Geomatics" are:

• to provide students with a wide, professional, practically oriented education, which gives an opportunity to easily adapt to the labor market, as well as to carry out scientific research work;

• to provide students with theoretical and practical training corresponding to the fifth level of professional qualification, which gives an opportunity to obtain the qualification of a civil engineer, as well as to continue education in doctoral studies;

• to create an opportunity for students to obtain a qualification closely related to their future work, to provide opportunities for the acquisition of theoretical knowledge and skills that would allow graduates to start practical activities after completing the program, to perform the duties of a civil engineer in geomatics;

• to ensure the acquisition of modern general knowledge, to develop economic and professional thinking, to promote students' analytical abilities, to develop skills in solving professional problems and tasks, to develop projects that would allow graduates to get involved in solving business problems;

• to develop the ability to work in a team and work with professionals in various fields, to provide an opportunity to develop foreign language skills, which would ensure the ability to cooperate with colleagues from other countries.

The content and scope of the examinations correspond to the content specified in the subject programs and the requirements for professional qualification skills and knowledge. All conditions for obtaining credit points are described in the program of each subject. The Master's professional study program "Geomatics" is implemented in lectures, practical classes, measurements - in previously prepared field landfills or specially equipped geodetic measurement auditoriums, as well as in independent studies, learning the basics of construction geography and its connection with other relevant economic sectors. All study courses included in the study program are related to the goals and tasks of the study program "Geomatics", as well as to the results to be achieved. Upon completion of the study courses, students must acquire the knowledge, skills and competencies required by the professional standard. Analyzing the connection of the goals of the study program, the results to be achieved with the information included in the study courses, the results to be achieved, the set goals and other indicators, and their compliance with the Cabinet of Ministers Regulations No. 512 "Regulations on the second level professional higher education August 26, it can be concluded that:

• The strategic goal of the study program is developed in such a way as to provide professional studies corresponding to the needs of the national economy, culture, national defense and security, as well as social needs, based on the theoretical foundations of the field of science, applicable to the profession of civil engineer;

• The content of the study program provides a set of knowledge, skills and competence in accordance with the knowledge, skills and competence of the 6th level of the framework specified in the Latvian education classification. The main parts of the program are: study courses; study

practice outside the educational institution (in the text - practice); a state examination, a part of which is the elaboration and defense of a master's thesis;

• The tasks of the study program are designed to educate students, ensuring the acquisition of the fifth level professional qualification of a civil engineer, which is in accordance with the level of 7 EQF, as well as to promote their competitiveness in the changing working environment and international labor market.

The requirements of the professional standard (civil engineer), after their evaluation by the Construction Industry Expert Council, have been included in the Construction Industry Qualifications Framework and will be further improved. Consequently, additional changes and additions will be made to the descriptions of study courses. The study system is designed in accordance with the Law on Education, the Law on Higher Education Institutions and the Law on Vocational Education, so that it maximally promotes the achievement of the goals set in the study programs and facilitates the fulfillment of tasks. The study system at the university is internally regulated by the documents regulating the relations between students and the university and the documents regulating the course and organization of studies, which are available at the program administration and virtually on the RTU website. Compliance of the Master's professional study program "Geomatics" with the state professional higher education standard. The Master's professional study program "Geomatics" has been established in accordance with the Cabinet of Ministers Regulations No. 512 “Regulations on the State Standard of the Second Level Professional Higher Education” and the decision “On Uniform Requirements for Study Programs of Riga Technical University” adopted at the March 28, 2015 meeting of the RTU Senate. Volume of the program - the volume of the study program and its structural distribution is in accordance with the state education standard. The amount of the program and study courses is expressed in credit points. The structure of the study program for obtaining the qualification of a geomatics engineer and civil engineer in accordance with the normative documents in the 2nd variant,

Option I:

Parts of the study program Volume, CP

A. Compulsory study subjects 7 CP

B. Compulsory optional study subjects 27 CP

D. Practice 6 CP E.

Master's thesis 20 CP

Total 60CP.

Distribution of the study program according to normative documents,

Option II:

Parts of the study program Volume, CP

A. Compulsory study subjects 14 CP

B. Compulsory optional study subjects 28 CP

D. Practice 26 CP

D. Practice 6 CP

E. Master's thesis 26 CP

Total 100CP. The professional standard of a civil engineer has been approved at the meeting of the

Tripartite Cooperation Sub-Council for Vocational Education and Employment on 13 October 2021, protocol no. 6.

Link(in Latvian): https://registri.visc.gov.lv/profizglitiba/dokumenti/standarti/2017/PS-184.pdf

The content of the Master's program is developed in accordance with this standard and fulfilling its requirements. At the beginning of the studies, students receive a short informative material, which contains the most important information for the student about the organization of studies and practical implementation. The content of the compulsory part and the compulsory optional part of the study program meets the requirements of the professional standard. During the development of the standard of the profession of geodesy and cartography, the opinions were coordinated between the future and existing employers and the representatives of the largest universities in Latvia, as the working group for the development of the professional standard consisted of representatives from public professional organizations and local governments. The nominal duration of studies in Geomatics in the 1st variant of full-time studies is 1 year 6 months. The total amount of the study program is 60 CP. The nominal duration of studies in Geomatics in the 2nd variant of full-time studies is 2 years 6 months. The total amount of the study program is 100 CP. In accordance with the new version of the state standard and the decision adopted at the RTU Senate meeting on March 23, 2015 “On the unified requirements for study programs at Riga Technical University”, improvements in the study program structure have been developed in cooperation with employers and program advisors. as well as by making substantive changes in the study courses in order to ensure their compliance with the requirements of the modern life situation and the standard of the profession. In order to meet the goals of the Latvian state's economic policy, the new labor market needs such an education and employment policy that would ensure the full use of human resources, thus creating a productive basis for economic growth. The study content is reflected in the program of each study course. The content of the subject program of the study program “Geomatics” is reviewed once a year to update the content of the study course, taking into account the changes in the field and daily necessities, which are also provided by the study program of each study subject. At the end of the study program “Geomatics” a professional master's degree in geomatics and a fifth level professional qualification (7th EQF) - “civil engineer” are awarded. 2018/2019 A mapping has been performed in the study year, in which the interaction of the goals and results to be achieved with the requirements of the professional standard and the goals of the study program is analyzed. The analysis of this matrix allowed to find the places in the descriptions of study courses that need to be improved. When presenting the developed matrix or mapping, suggestions were received, which allow to improve the study courses. Academic staff, whose study courses are included in the study plans of the autumn or spring semester of a particular academic year in all higher level study programs in full-time studies, place subject calendar plans in the ORTUS e-learning environment, which include lesson topics for all lectures and practical work, practical work, laboratory work etc., as well as the conditions for obtaining a successful assessment in the study course, which describes all the requirements that a student must meet in order to obtain a successful assessment of the subject (for example, information about planned tests and independent work assignments, may affect the assessment of the student's work).

In order to ensure the interaction of knowledge, competencies and skills acquired by graduates, special emphasis is placed on the development and implementation of study courses:

• to reflect current problem situations in the content of the study program (at the level of lectures, practical work), incl. analysis of the real situation of the study program and provision of solutions within the content framework of the specific course;

• use of modern teaching methods (solutions of specialized data programs, use of unified solution algorithm, solution-oriented methods, programming, etc.);

• the integrity of the study course and the study program, i.e. developing an inter-course learning approach (for example, the study courses Local Geodetic Networks and Elevation Determination with GPS inter-course learning approaches using coordinate detection, interpretation tools, etc.);

• for the improvement of study methods in cooperation with foreign experts (for example, Vilnius Gediminas Technical University) for a distance learning form using the e-learning environment ORTUS of Riga Technical University (RTU).

Individual access for students is provided:

• study materials are provided in the form of both handouts and electronic materials and presentations;

• if necessary, the lecturer plans individual meetings and consultations with the student, because each lecturer has a consultation schedule, which students are introduced to in the first lecture, in the RTU ORTUS system, lecturers must indicate possible consultation times and for the respective times, as well as consultation times are available at geomatika.rtu.lv;

• the individual approach is observed in the choice of applied teaching methods, analysis of individual topics and problems during lectures, practical work, laboratory work and seminars;

• when choosing the topic of the master's thesis, the student's wishes and the specifics of the work in the chosen specialization are taken into account;

• Intensive and regular electronic communication takes place both in the electronic mail, in the ORTUS environment and on the website. When implementing the study program, its goal corresponds to the 7th level of the European Qualifications Framework (EQF) and the 5th professional qualification level of the Latvian Qualifications Framework (LQF) and is achieved. During the implementation of the program, mutual feedback is regularly provided. Students receive regular feedback from the lecturers on the submitted tests, course, exam, study projects, reports, practice reports and presentations. In the middle and at the end of the study course, the lecturers can conduct a survey on students' satisfaction with the content of the course, their wishes, as well as listen to suggestions.

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

The Professional Master Study Programme “Geomatics”. Democracy and a dialogue with students are one of the core principles of the study programmes of the Faculty of Civil Engineering of Riga Technical University, as well as students are actively involved in the study process improvement. Students can take part in improvement of the study process directly – by expressing their wishes to the instructor of the specific study course, heads of departments, head of the study programme or with the help of representatives of Student Self-Government who are members of the Council of the Faculty of Civil Engineering, RTU Senate and RTU Senate commissions, as well as

RTU Academic Assembly.

The study programme administration reckons that relations of the Faculty of Civil Engineering with students are characterised by mutual trust, cooperation, respect and honesty that promote understanding, correct perception and ability to use knowledge in practice.

To ensure the principle of democracy, the work of professors, assistant professors, lecturers and guest lecturers is evaluated by students at least once a semester by replying anonymously in the ORTUS environment to questions of the survey. In the ORTUS environment, RTU Study Department conducts surveys of the portal users and different questionnaires regularly, including assessment of the academic staff work at least twice during a study year. Students can thus provide feedback on the quality of the study courses and the professional performance of the academic staff. Questionnaires include questions on the availability of study materials for a particular course, instructor evaluation criteria, culture and quality of work, observation of rights of students during the course, the time spent on the student's own work and the study discipline. The final part of the questionnaire is intended for student proposals and initiatives to improve the quality of the study course and the instructor's work. The questionnaires are completed anonymously so that the responses provided are not likely to affect attitudes of an instructor towards a given student or a group of students and the goal of obtaining an objective assessment of students is reached. Still, it has to be acknowledged that not all students use this opportunity.

In order to ensure a link among students, academic staff and the programme administration, the Student Self-Government of the Faculty of Civil Engineering, which actively participates in all these processes and carries out the annual evaluation of academic staff, plays an important role. The annual Pride Award of the Faculty of Civil Engineering has been created to honour the best academic staff, which is a student event to assess the work of the academic staff. The didactic concept of the study programme is based on the use of the latest and most advanced teaching methods. It provides for the development of the content of studies and a study organisation which ensures the sequential and in-depth acquisition of the knowledge provided for in the study programme and aims to address real practical examples and challenges, and an in-depth study of theoretical and practical issues in the field of geodesy and cartography. This includes knowledge acquisition stimulating methods, interactive cooperation among students, instructors and internship supervisors, as well as free debates in a multicultural environment. The programme uses training methods such as group work, situation analysis, seminars, discussions, field trips to industry companies and facilities to learn and consolidate the study material in an appropriate working environment, lecturing through PowerPoint or other presentations.

In addition to the theoretical courses in the university premises, learning trips to industry enterprises and organisations in Latvia are organised. Learning trips are organised both to promote in-depth acquisition of a theme within a definite study course and as thematic trips. Field trips and study visits ensure that the content of the study programme is linked to the specific nature of the sector, students acquire not only theoretical knowledge but are able to link it to daily situations in industry companies, analyse problems and reason their views.

The programme uses the Ortus interactive e-learning environment of RTU based on the Moodle platform, which is regularly used by students, academic staff and guest lecturers of the study programme. In the Ortus portal, the student has access to all up-to-date information in the course of the study process. It contains current study courses (annotations, requirements for successful completion of the study course, plan of lectures, lecture and practice materials, required references, etc.), information on students' achievements and completed study courses, current reports, library information, access to teaching and scientific literature and databases, e-mail, etc. In the e-learning environment, academic staff places different tests and tasks for self-control of the

student’s knowledge, as well as the system allows for the creation of different interim tests and credit tests. Within the Ortus framework, it is possible to communicate with the academic staff members, and also with groupmates as part of current courses. The portal has discussion forums, regular surveys on the content, quality and academic staff of study courses, presentations, and other audio, video and technical aids.

In order to ensure achievement of the learning outcomes in the study process, students are presented the aims, tasks and learning outcomes to be achieved, as well as the assessment requirements, both at the beginning of the first study year and at the beginning of each study course. Students know in good time the criteria for evaluating examinations, tests and other works in accordance with RTU Study Regulations.

There are 2 implementation options in the study program, which depends on the students' previous knowledge and professional qualifications. In order to ensure compliance with the goals of the program and fulfill the tasks to be achieved, students without a previous professional qualification are provided with appropriate practice in the field. The specifics of the work in the field are introduced, professional skills and abilities are acquired. This is also the main difference in the implementation of these 2 options and there are no differences in the teaching methods used. Guided by the study courses in the program, students choose and acquire limited choice study courses in accordance with the uniform requirements in the program.

General distribution of evaluation is specified in the description of each study course.

Contents and volume of the tests corresponds to the specifications of the curriculum of the study course and requirements towards professional skills and knowledge. All requirements for obtaining credit points are described in the syllabus of each study course.

The main assessment principles within the study programme are:

- the principle of summing up positive achievements;
- the principle of mandatory evaluation;
- the principle of openness and clarity of evaluation criteria;
- the principle of diversity of forms of assessment;
- the principle of availability of evaluation.

The quality of the education to be obtained is monitored by using surveys of graduates, employers and students of the professional Master study programme “Geomatics”, results of examinations and tests, assessment of study papers and projects, internship reports and Master Theses.

The main evaluation platforms of mastering the programme is examination and credit test to be passed at the end of each study course. The examination form is set in the study programme.

The assessment of learning outcomes is performed in accordance with Regulation on the Assessment of Learning Outcomes https://www.rtu.lv/writable/public_files/RTU_1_studiju_rezultatu_vertesanas_nolikums.pdf (in Latvian) and Regulation on Final Examinations at Riga Technical University RTU_par_nolikuma_par_studiju_nosleguma_parbaudijumiem_rtu_apstiprinasanu_jauna_redakcija.pdf (in Latvian).

Teaching methods, structure of study courses and evaluation methods are selected by the academic staff responsible for the study course, according to the specific nature of the course and programme, as well as the needs of students. Training courses and seminars on the latest teaching and pedagogical methods are organised for academic staff, as well as they are promoted to attend qualification upgrade courses, both at internal events of the Faculty and at RTU level, nationally and internationally. RTU Academic Excellence Centre organises activities for the professional

development of academic staff at the university level. Academic staff informs students about the specific assessment criteria of each study course at the first lecture, as well as they are published on the course page in ORTUS e-learning environment.

Master Thesis comprises a practical research in geodesy, cartography or land management with a part of the project in the relevant specialisation, in which a specific project is carried out with all the necessary practical measurements and calculations, linking as far as possible to the place of the student's internship.

Students are able to demonstrate basic and specialised knowledge of professional activity and critical understanding of that knowledge when developing their Master Thesis, with a share of knowledge corresponding to the highest level of achievement of the field or the latest scientific knowledge.

Master Thesis is publicly defended for the evaluation of which the State Examination Commission is appointed by the RTU Rector, consisting of a broad representation of future employers and representatives of other universities. Master Theses are evaluated by reviewers approved by the Dean of the Faculty of Civil Engineering.

The principles of student-centred education are also taken into account in the implementation of the study process.

1. Student involvement in the study process and its development

RTU has developed procedures that offer students the opportunity to provide feedback on the quality of the study process (surveys, regular meetings with the programme director, etc.) Therefore, students have an opportunity to influence their study process.

Students under the programme are regularly involved in evaluating the quality of study programmes, participating in decision-making bodies and advisory bodies, and are also involved in writing a self-assessment report.

2. Learning outcomes

The evaluations of study courses and the number of credit points of the programme relate to the learning outcomes and students are informed about these. Academic staff associate the learning outcomes of the course with that of the study programme and reason the need for mastering the information of this course for mastering the respective profession.

Exam and test are the main forms of assessment within the study programme, which shall be passed at the end of each study course. The exact mode is specified in the description of the description study course. Assessment of learning outcomes is performed in accordance with the Regulation on the Criteria for Evaluation of Learning Outcomes

https://www.rtu.lv/writable/public_files/RTU_1_studiju_rezultatu_vertesanas_nolikums.pdf (in Latvian) and the Regulation on the Final Examination at Riga Technical University RTU_par_nolikuma_par_studiju_nosleguma_parbaudijumiem_rtu_apstiprinasanu_jauna_redakcija.pdf (in Latvian)

3. Mobility

Mobility resources are used in the study programme to improve the pedagogical process of higher education, as the student-centred educational approach is based on a strong pedagogical process. Foreign university academic staff are involved in the implementation of the study programme, for example, a 2-hour guest lecture on "Geodetic Works and Coordination Base: Latvia and Lithuania", led by Eimuntas Paršeliunas from Vilnius Gedeminas Technical University, Lithuania, has been

conducted in the framework of the study course “Fundamentals of Geomatics”.

Thus, not only students, but also the academic staff involved in the implementation of the programme take advantage of the good practices that can be shared by guest lecturers.

4. Social dimension

The study process is flexible enough to connect work/family life with studies. This is demonstrated by the graduate survey results, which indicate that nearly 95% of students already work during studies. It is a positive point to mention that the premises of RTU Library are available to students 24 h and also on holidays.

5. Teaching and learning methods

Different teaching and learning methods are used in the implementation of the programme. For example, study projects are being developed, group works and seminars are taking place, and some study courses use a method that allows students to assess and learn from each other. There are also regular field trips and guest lectures. Students are invited and participate in international professional competitions, such as International GIS Days organised at higher education institutions of Kaunas, Lithuania. Students have the opportunity to receive individual tutorials with academic staff, including e-learning environment communication, Zoom, WhatsApp, etc.

6. Learning environment

Cooperation between librarians and academic staff is underway in the course of the programme with a view to improving the teaching and learning process. Students are presented with the resources and databases available in the library. Similarly, both academic staff involved in the programme and students are provided with access to research and learning in suitable premises with adequate equipment. Both students and academic staff may use department laboratories with different databases for the process of developing their research papers.

7. Academic personnel competence development

The academic staff involved in the programme is provided with regular opportunities for the development of their methodological and didactic skills. Teaching methods, structure of study courses and evaluation methods are selected by the academic staff responsible for the study course, according to the specific nature of the course and programme, as well as the needs of students.

Training courses and seminars on the latest teaching and pedagogical methods are organised for academic staff, as well as they are promoted to attend qualification upgrade courses at internal events of the Faculty, at RTU level and internationally. RTU Academic Excellence Centre organises activities for the professional development of academic staff at the university level.

The development of competences for academic staff also includes discussions on the use of teaching and learning methods, including innovative teaching methods. Within the framework of international ERASMUS+ projects and Nordplus projects, academic staff are involved in the development of new study courses, share experience in the use of study methods, materials and programmes with representatives of different European universities.

8. Extra-curricular student activities

The programme administration supports activities of the Student Self-government and encourages students to engage in it, thereby allowing students to develop their own self-consistency by providing students with an opportunity to implement their ideas, as well as opportunities for additional learning outside lectures. Students’ desire to develop their ideas in project competitions,

business incubators, use the RTU Design Factory capabilities for prototype development and many other options are also supported.

All students of the programme are offered opportunities to engage in extra-curricular activities (Self-government, dance collective, choirs, debate associations, theatre studio, etc.). All this points to the active extra-curricular life of students and the opportunities for such activities for students.

Students in the geomatic industry have a variety of erudition contests, such as “Are You the Surveyor No.1?” and “Geomatic Competition”, which help students find out different aspects of the geomatic industry by interacting in friendly competition. The events take place on the scale of the Department of Geomatics, where it is possible to engage in the event in various mixed teams, as well as cross-university events are organised that allow students to meet other representatives of the field of geomatics in Latvia. At the same time, it also helps students become aware of the skills acquired during their studies, seeing their strengths and weaknesses, which are then developed by students in the learning process. It is noted that sometimes such measures contribute to students’ desire to explore the study matter more profoundly. For example, in the process of arranging the competition “Are You the Surveyor No.1?”, RTU teams asked the lecturer to help them preparing for the competition, in addition to practicing the various disciplines of competition erudition and practicality, which resulted in the unbeatable victory of RTU teams over several years and the enhanced convergence of courses, which in turn contributed to a better understanding of their further study process by students and internship at companies. As far as possible, activities also attract industry companies that motivate students with different awards and opportunities to operate in their businesses in the future.

Students of the study programme are also involved in scientific work and research on topical issues in the sector, participating in both local and international conferences. Student Scientific and Technical Conferences are organised in the spring semester.

Students can also participate in the annual International Scientific Conference of RTU. Research results are summarised after each part of the conference and a collection of theses is published.

The Council of European Geodetic Surveyors (CLGE) has been hosting an annual student contest for eight years. For several years now, students of the Department of Geomatics have been taking part in this contest, demonstrating that they are competitive and having received CLGE awards in various nominations for three consecutive years. In 2019, it was reported that Latvian students were the most active among all European Member States and most thesis were submitted exactly from Latvia, half of which were from RTU students. In 2020, the European GNSS Agency (GSA) also became co-authors of this contest. The cooperation has lasted for several years and, as the GSA’s role in the contest has increased, GSA and CLGE have become partners, sharing the idea of organising this contest jointly in the future. Hence, the format has also changed for the student contest, and two directions of the contest have been created – “CLGE Students’ Contest on the Move” and "Geomatics on the Move Prize 2020”. With the change of the format, the participation requirements have also increased, but it has not prevented representatives of the Department of Geomatics from participating and also this time one student has been nominated for the finals.

Every year, there is a student contest of the State Land Service and the Latvian Association of Surveyors organised, for which Master Theses of young graduates are nominated. Students of the Department of Geomatics are also nominated for this contest, having received recognition for effective, innovative and industry-relevant research, described and addressed in the framework of the Master Theses. Student-centred education provides for active participation of students in the study process, using a variety of teaching methods (discussion, practical tasks), which in turn promote equality between students and academic staff. This process is implemented by academic staff in their study courses, such as Assoc. Prof. M. Kaļinka and lecturer U. Krutova in their study

courses related to geodesic measurements, calculations, software and cartography, geographic information systems organise seminars, where each student presents their theme, acting as a lecturer. Other members of the academic staff actively use group work at their practical classes, facilitating understanding of teamwork and common responsibility for the results of their work.

The results of the assessment of students' knowledge are discussed twice during the course of studies at the meetings of the Department of Geomatics, they are summarised, evaluated by the programme administration and serve as a basis for further development of the learning process. The results are also discussed at the meetings of the Council of the Faculty of Civil Engineering.

The learning outcomes of the students tend to be different. Full-time students have a very wide range of average grades for their first year of study. This is due to the different levels of previous knowledge among students. Analysing the issue, it must be concluded that, compared to previous years, the learning outcomes have increased and attitudes of students to learning have improved. Certainly, it is also the result of changes in the working style of academic staff, as well as the use of innovative approaches included in courses of study programmes, by organising the study process in a cooperative manner, in cooperation with the industry leading professionals and students of the study programme.

It must be concluded that, compared to previous years, awareness of students and attitudes towards learning more effectively through the use of newer innovative dual approaches to study courses have increased. The first year is based on general education and field-specific study courses. In the next years of study, the situation regarding the learning outcomes continues to improve in terms of success, which is also reflected in the following indicators. RTU has the Alumni Golden Fund that includes the most prominent and capable RTU graduates, assessing them both by academic achievements and by public activities. Since 2013/2014 academic year, students of the study programme have also been included in the Golden Fund. During the last six years, 5 graduates of the Master study programme were included in the Golden Fund. In academic year 2013/2014, 1 graduate was included in the Golden Fund and in 2016/2017 - another graduate of the programme. In 2017/2018, already 2 programme graduates were included. In 2018/2019, one more programme graduate was included in the Golden Fund.

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

The Professional Bachelor Study Programme "Geomatics" internship in the amount of 32 credit points, intended for graduates of the academic bachelor study program. The internship in the amount of 6 credit points is intended for prof. bachelor's degree programs with engineering qualifications.

Industry internship is an integral part of professional study programmes which is to be done according to LR regulations, the resolution of RTU Senate No 467 of 29 April, 2002 "On the structure of the second-level professional study programmes" and the resolution of RTU Senate No 626 of 28

January, 2019 “On organization of internship at Riga Technical University, new edition”. Internship outside the educational establishment is an integral part of professional programmes to be undertaken by students under Regulations of the Republic of Latvia, the Decision of RTU Senate of 29 April 2002, Minutes No. 467, “On the Structure of Second-Level Professional Study Programmes” and the Decision of the RTU Senate of 28 January 2019, Minutes No. 626, “On the Approval of the Internship Organisation Procedure at Riga Technical University in a New Version”.

Internship takes place in accordance with the Regulation, in which general provisions are developed by RTU Senate. The Regulation of RTU Senate is published on the University website and in the ORTUS system. The Senate decision on the Internship Organisation Procedure, updated in 2019, prescribes that in providing a place of internship, students are assisted by an internship coordinator of the respective organisational unit. If additional assistance is needed, it is possible to apply to the Career Support and Services Department, where a career adviser and a project manager help students with searching for internship places and, through a variety of measures, develop career management skills that can deliver successful results in the internship process.

Once a year, the Career Support and Services Department organises RTU Career Day, within the framework of which students can meet representatives of companies and communicate on their future work and internship opportunities.

An additional resource, which has been developed since 2015, is the webpage, where companies are invited to place their vacancies, which are topical for RTU students (https://ekarjera.rtu.lv/). By using the University password, students can connect and follow available internship places and later also job opportunities.

Additional support in promoting practical skills is RTU Development Fund (https://www.rtu.lv/lv/attistibasfonds). During a year, several hundred practical skills promotion contests are offered, organised in cooperation with businesses, where students have the opportunity to acquire practical skills.

Internship is implemented in accordance with the internship agreement concluded by RTU with the employer on the provision of a place of internship and the student. The internship agreement includes the aim and tasks of the internship, its planning, the procedure for evaluating the internship achievements, as well as duties and responsibilities of the parties. When determining the aims and tasks of the internship, it also includes familiarising of the student with the organisational structure and operational principles of the relevant internship place. Representatives of organisations or undertakings with which the internship agreement is concluded participate in determining the aims and tasks of internship, as well as evaluate it. There are internship commissions set to examine the performed work according to the provisions of the internship agreement. As a result, a close cooperation is established with enterprises, organisations, state and municipal institutions, where graduates of RTU Department of Geomatics of the Faculty of Civil Engineering work, who help ensure internship places for students. It is especially worth noting that among places of internship we have the honour to name the State Land Service, the Latvian Geospatial Information Agency, Ltd. Metrum, Ltd. Merko and many other enterprises. There is another internship planned within the study programme. One major period of internship is planned in the study programme. The scope and planning of the internship are as follows: Specialising practical placement (at an enterprise): 32 CP. Student internship places are ensured in organisations which are members of the professional associations, private firms, state and municipal institutions.

The main aim of internship is to ensure and promote combining of students’ theoretical knowledge with practical work, in order to evaluate opportunities to use the knowledge obtained at the university in practice, as well as consolidation and development of professional skills. During the

internship, familiarisation with real or industrial aspects of geodesy, cartography and land survey takes place.

During the internship, students develop their internship reports in compliance with the internship programme requirements, as well as complete a comprehensive internship report/description in accordance with the detailed tasks. The internship report is written during the internship. It is to be submitted to the superviser of internship at the final stage of the internship and to be publicly presented at the internship assessment commission established by the Department of Geomatics within the term indicated in the semester schedule. To provide a wider publicity and to make the schedule clear for all, this information is also published on the webpage of the Department of Geomatics (geomatika.rtu.lv) for the convenience of the academic staff and students.

The ***aim*** of the internship is:

To develop ability to join a team, get familiarized with the technical and technological equipment of the company, prepare technical specifications and information materials, fulfil practical tasks by applying the knowledge acquired during studies.

If students need it, RTU offers assistance of a student career specialist, who can find a suitable place of internship, but a student also can choose the place of internship individually, which is also the most popular way of finding a place for internship.

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

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

Professional Master Study Programme "Geomatics" envisages the final examination – Master Thesis.

Upon completion of the professional Master study programme, the graduate should be able to carry out professional, innovative and research activities by using theoretical knowledge and skills, and to formulate and describe information, problems and solutions analytically.

In the Master Thesis, a student analyses, evaluates, conducts research, offers solutions, develops a practical solution or project, etc.

At the end of the programme, students should develop their Master Thesis dedicated to topical challenges in the field of geodesy, cartography or land management, related to the acquisition, processing, analysis of the geospatial data or innovative solutions in the field of specialisation.

The Master Thesis is presented publicly in front of the State Examination Commission. The Commission operates in accordance with the university regulation approved by the Senate; it includes, complying with the requirements, the industry representatives. The State Examination Commission includes industry representatives with high professional qualification and experience.

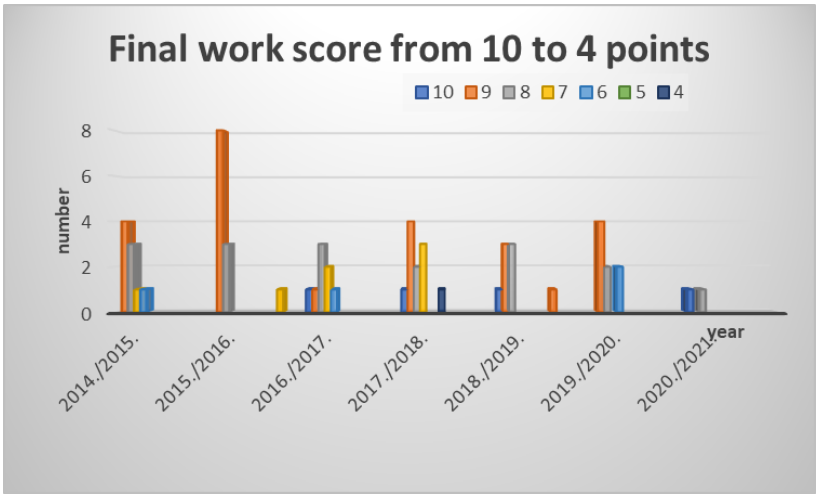
Themes of the Master Theses comply with the latest tendencies in geodesy, cartography and land management. The State Examination Commission includes industry representatives with high professional qualification and practical work experience. The study programme, in the process of its implementation, is supplemented and updated, based on common research and consultations with employers and professionals in the field. Recommendations of graduates, students and the academic staff are significant in the study process improvement. Changes are focused mostly on changing the learning style with “learning to learn” and information technology integration, programming, own-initiative solutions. The study process is organised in such a way that the themes of study and research papers include essential issues of the geospatial field.

Students acquire research skills by working regularly with references and Internet resources to successfully develop different study papers, internship reports and the Master Thesis. This promotes research by students, working with international scientific databases, international standards (ISO) available at the RTU library with an electronic approach from the ORTUS environment, as well as the information sources and materials needed for the Master Thesis are already collected in the course of studies undertaking internship at an enterprise.

Upon public presentation of each Master Thesis, the State Examination Commission provides a report on the quality of the developed Master Thesis, its topicality and the average assessment of the student. During public presentation of the Master Thesis, the Minutes are taken, where the main questions and the obtained assessment are reflected. The themes of the students’ graduation papers are topical, comply with the programme aims, ensure the learning outcomes and are in conformity with the needs of the field of geomatics, geodesy, cartography and land management, innovations and science tendencies.

For example, in 2019 and 2020, the following themes were chosen:

- GNSS Base Station Parameters for Increasing the Accuracy of Field Receiver Measurements;
- Examination of Spatial Data Sets;
- Monitoring of Deformation Sutures in Hydrotechnical Buildings;
- ADTI Data Usage in Augmented Reality;
- Application of Survey Data in the Detection of Urban Changes;
- Visual Reality of the Struve Geodetic Circle;
- Usage of Sentinel-1 and Sentinel-2 Images to Identify Potentially Flooding Areas;
- Automatic Identification of Vertical Barriers in Air Navigation;
- Spatial Documentation of Jaunauce Castle;
- Hydrographic Measurements and Activities of their Projects in Latvia;
- GNSS Galileo Contribution to Increasing the Quality of Measurements;
- Determining Soil Moisture with Surveying Methods in Forest Lands;
- RTK and PPK Technologies for Unmanned Aerial Vehicles.



Analysing the data, it is clear that the aforementioned themes of the Master Theses are closely related to the topical issues of geomatics industry (geodesy, cartography and land management).

3.3. Resources and Provision of the Study Programme

3.3.1. Assessment of the compliance of the resources and provision (study provision, scientific support (if applicable), informative provision (including libraries), material and technical provision, and financial provision) with the conditions for the implementation of the study programme and the learning outcomes to be achieved by providing the respective examples.

The study process is fully provided with latest educational materials, which students receive from RTU Central Library or the textbook subscription and can use during the entire period of studies. RTU students and academic staff have a wide and modern RTU Scientific Library available (in Ķīpsala, at Paula Valdena Street 5), where it is possible to use all kinds of educational materials, electronic subscription databases and temporary test databases. Working hours of the Library reading room for RTU students is 24/7, as the reading room of RTU Scientific Library is the place, where students can learn also late at night, beyond the working hours of the Library or the faculties. To intensify the study process, students are provided a continuous access to the RTU unified study support system "ORTUS". Currently, ORTUS provides students with:

- uploading of lecture materials and presentations;
- automatic uploading of video recordings of the lectures;
- regulatory enactments for study processes and amendments thereto;
- remote authorisation of students for commercial electronic information means (databases);
- electronic processing of tests and home assignments;
- information on learning outcomes of a student; information on a student's financial position, with an opportunity to prepare invoices in electronic form;
- online registration/cancellation of registration for the next semester courses.

In order to supplement the amount of information sources and to restore the content of the expenditure available in the Library, the study programme administration has purchased new textbooks. The table below summarises the number of textbooks purchased and the amount of

money spent.

Year	Programme	EUR	Number of copies
2019	Geomatics	214,75	5
2018	Geomatics	689.18	5
2017	Geomatics	808.12	11
2016	Geomatics	636.65	11
2015	Geomatics	665.97	8
2014	Geomatics	632.10	7

In order to ensure the qualitative study process, FCE is carrying out extensive refurbishment works, upon their completion the Faculty will meet international standards for campuses and lecture halls. Numerous new laboratories will be opened, which will promote development of the practical component of the study courses and introduction of technologies in the study process. The equipment in the existing premises is also continuously updated. Classification of the premises is given in the table below.

Room type	Number of rooms	Useful area m²
Meeting room	1	70.91
Computer rooms	4	243.77
Auditoriums	23	1702.34
Teachers' rooms, cabinets	69	1523.61
Assistant professor / Doctoral student premises	5	196.24
Workspace / workshop	6	172.19
Research facilities	6	350.53

Laboratories	35	1256.83
Resource room	6	213.53
Auxiliary room	11	197.99
Anteroom	3	35.89
Student self-government and record keeping	3	260.43
Kitchen	1	16.43
Total		**6240.69**

The Department of Geomatics, which implements the study programmes being part of the Faculty of Civil Engineering, has set up its own geodetic survey tool laboratory, in which students have the possibility to use geodetic laboratory equipment and relevant special computer programs for various study courses, such as “Geodesy”, “Practical Geodesy”, “Advanced Geodesy”, “Geodetic Measurement Processing”, “Global Positioning Systems” or other study courses. The following can be mentioned as examples:

1) precise tachymeters for surveying geodetic networks, with special software;

- leveling instruments for building high-altitude networks with data processing computer programs;
- Laser scanners for indoor and outdoor premises, with special programming equipment for the acquisition, processing and modelling of 3D data;
- cable locator;
- quartz spring gravimeter GNU-KV;
- professional drone – FlyTop, unmanned aerial vehicle FLYNOVEX with a control unit, six accumulators, battery charging equipment, high-definition camera and thermal camera FLIR VUE PRO, used by the Department of Geomatics in collaboration with the Institute of Civil Engineering and Real Estate Economics (ICEREE);
- Mavic 2 Enterprise Dual drone with smart controller equipped with high-performance cameras and thermal cameras, including programming for measured data processing;
- several GNSS receivers, including the latest and the most modern receiver and controller Leica Viva GS12 + CS15, which receives signals of GPS + GLONASS + GALILEO satellite systems.

Students can use the services provided by RTU Library (https://www.rtu.lv/en/studies/scientific-library). They also have resource rooms at their disposal, where they can familiarise themselves with latest periodicals, statistical materials, books, conference materials on the topical issues in the field.

The Department also has a free-access special literature library, where a student can take a book of interest and return it afterwards.

The Scientific Library of RTU (https://www.rtu.lv/en/studies/scientific-library) is an academic library of state significance, which has obtained its status as a result of library accreditation. The Scientific

Library of RTU provides the necessary information for RTU study process and research activities, performs library, bibliographic and information services for RTU students, teaching staff, and employees. The Library's collection includes 1.4 million printed documents and e-resources in the databases relevant to RTU fields.

In 2016, significant investment was made in the development of the library infrastructure, with the construction of an additional 2240 m2 of space for the Central Library. The total area of the library premises is 6393 m2, of which 3417 m2 are for reader services. There are 713 workstations for library users. The library has four group rooms and six individual cubicles, a Western reading room and a conference room. The library is accessible to users with reduced mobility.

To improve the work of the Scientific Library of RTU and to ensure the availability of information needed for study and research work, the Library Council has been established, which decides on the replenishment of the library's collection with printed publications and subscriptions to the necessary databases. The Library Council has approved the "*RTU SL Collection Completion Policy*", which defines the basic principles of collection formation and development in accordance with the directions of RTU study and scientific activities.

When RTU provides funding for the library, the funding for information resources for each study programme is calculated. The collection is replenished according to the recommendations of the heads of study programme, researchers, and the allocated funding. The desired titles can be ordered by contacting the Library's Collection Development Department, ordering on the Library's website, filling in the order form, filling in the application form, by phone or by visiting the Library. The Scientific Library offers a guide to ordering titles and e-resources, which brings together the websites of various publishers and bookshops in Latvia and abroad.

The following publications have been acquired to ensure the library resources of the study programme:

Auziņš, Armands. Zemes izmantošanas novērtēšana un pārvaldība: zinātniska monogrāfija. Riga: RTU Publishing House, 2016. 270 p;

Bērziņa, M. u.c. Kadastrs: no viduslaiku nodevu saraksta līdz modernai informācijas sistēmai un daudzfunkcionālam kadastram. Riga: VZD, 2013. 311 p;

Stūrmanis, E. Ģeoinformācijas sistēmas. Jelgava: LLU, 2006. 90 p;

Heywood, I., Cornelius, S., Carver S. An Introduction to Geographical Information Systems. New York: Wesley Logman, 1998. p 279.;

Štrauhmanis, J. Tematiskā kartogrāfija. Riga: RTU, 2002. 64.;

Štrauhmanis, J. Kartogrāfija tūrismā. Riga: Turība, 2004. 80 p;

Štrauhmanis, J. Kartogrāfija. Riga: RTU, 2004. 118 p.;

Šrauhmanis J. Kartogrāfija. Riga: Zvaigzne, 1993. 52 p.;

B.Helfriča, U.Zuments. Ģeodēzija. Riga: LĢIA, 2007. 262 lpp.;

2003. Vanags. Mūsdienu Latvijas topogrāfiskās kartes: Fotogrammetrija. Riga: VZD, 2003.;

Mūsdienu Latvijas topogrāfiskās kartes. Riga: VZD, 2001.;

Auziņš, A. Zemes pārvaldības pamati. Riga: RTU Publishing House, 2008.;

Žagars, J,. Zvirgzds, J., Kaminskis, J. Globālā navigācijas satelītu sistēmas / GNSS. 2014. 232 p.;

Rikitake, T., Honkura, Y. Solid Earth Geomagnetism (Developments in Earth and Planetary Sciences,

5). New York: Springer, 1985. 385 pp.;

Jankowski, J., Sucksdorf, C. Guide for Magnetic Measurements and Observatory Practice. Warsaw: IAGA, 1996. 238 pp.;

Mandea, M., Korte, M. Geometric Observations and Models. New York: Springer, 2011. 344 pp.;

Newitt, L., R, Barton, C., E., Bitterly, J. Guide for Magnetic Repeat Station Surveys. Warsaw: IAGA, 1996. 129 pp.;

Ģeomātikas pamati: mācību līdzeklis. Riga: RTU, 2006. 66 p.;

1993. Freijs, O. Jakubovskis, M. Kronbergs, U. Zuments. Ģeodēzija. Riga: Zvaigzne, 1993. 383 p.;

1994. Biķis, V. Freijs, M. Kronbergs, R. Krūpens, O. Jakubovskis. Ģeodēzija: mācību līdzeklis LPSR augstskolu studentiem ģeodēzijas kursa apguvei. Riga: Zvaigzne, 1974. 407 p.;

Helfriča, B. Mērniecība: mācību līdzeklis. Jelgava: Latvijas Lauksaimniecības universitāte, 2007.;

Helfriča, B. Mērniecība: mācību līdzeklis. Jelgava: LLU, 2004.;

Balodis, J. Mērniecība. Riga: Autora izdevums, 1934.;

2001. Boruks, V. Eihmane, G. Kalniņš, O. Nikodemus, V. Paršova, P. Zālītis. Zemes izmantošana un kadastrs Latvijā. Riga: LLU Skrīveru zinātnes centrs, VZD, 2001. 405 p.;

Rīgas Tehniskās universitātes zinātniskie raksti. 11. sērija, Ģeomātika. Riga: RTU, 2007.;

Ģeomātika: zinātnisko rakstu krājums. Riga: RTU, 2005.;

2003. Kondruse. Darbs ar karti un plānu: praktiskie darbi ģeodēzijā. Riga: RTU, 2003.;

Apse, I. UTM koordinātu sistēmas (NATO standarts) Eiropas un krievu miljēmu topogrāfiskā leņķa [alfa] T, attāluma DT skaitļošanas tabulas. Riga: Imants Apse, 2001. 73 p.;

Howard, K., Mcmaster, S. Thematic cartography and geovisualization. 3rd edition. Harlow: Pearson, 2014. 618 lpp.;

Dent, Borden D. Cartograph: thematic map design. 6th edition. New York: McGraw-Hill Higher Education, 2009. 336 p.;

DeMers, Michael N. GIS modeling in raster. New York: J. Wiley, 2002. 203 p.;

Yan, Haowen. Surveying: principles and methods. Oxford: Alpha Science International, 2012. 318 lpp.;

Sands, Russell. Handbook of geodetic science. New York: Callisto Reference, 2015. 342 p.;

Bolbol, Saad. Hand book of geodetic astronomy: theory and practice. Saarbrücken: Lambert, 2011. 157 p.;

Phillips, Lee. Gnuplot cookbook: over 80 recipes to visually explore the full range of features of the world's preeminent open-source graphing system. Birmingham: Packt Publishing, 2012. 205 p.;

Jensen, John R. Remote sensing of the environment: an earth resource perspective. 2nd edition. Harlow: Pearson, 2014. 614 p.;

Meyer, Thomas Henry. Introduction to geometrical and physical geodesy: foundations of geomatics. Redlands: ESRI Press, 2010. 246 p.;

Advances in remote sensing for natural resource monitoring. Hoboken: Wiley-Blackwell, 2021. 480 p.;

Ghilani, Charles D. Elementary surveying: an introduction to geomatics. 14th edition, global edition. Harlow: Pearson, 2016. 958 p.;

Paul A. Longley et al. Geographic information systems and science. 3rd edition. Hoboken: Wiley, 2010. 539 lpp.;

Paul A. Longley et al. Geographic information systems and science. 4th edition. Hoboken: Wiley, 2015. 477 lpp.;

Nisbet, Gloria. Introduction to Geodesy. New York: Larsen & Keller, 2018. 231 p.;

Van Sickle, Jan. GPS for Land Surveyors. Fourth edition. Boca Raton: CRC Press, Taylor & Francis Group, 2015. 349 p.;

Seeber, Günter. Satellite geodesy / Günter Seeber. Berlin, New York: de Gruyter, 2003. 589 p.;

Applications of 3D measurement from images. Dunbeath: Whittles Publishing, Boca Raton, FL: CRC Press, 2007. 304 p;

Luhmann, T. Close-range photogrammetry and 3d imaging. 3rd edition. Berlin, Boston: Walter de Gruyter, 2020. 822 p.;

Ogaja, Clement A. Geomatics engineering: a practical guide to project design. Boca Raton, London, New York: Taylor & Francis, 2011. 264 p.;

Topographic laser ranging and scanning: principles and processing. Boca Raton [etc.]: CRC Press/Taylor & Francis Group, 2009. 590 p.;

Stoter, Jantien. 3D cadastre in an international context: legal, organizational, and technological aspects. Boca Raton [etc.]: Taylor & Francis, 2006. 323 p.;

Leick, Alfred. GPS satellite surveying. 3rd ed. Hoboken: John Wiley, 2004. 435 p.;

Hildebrandt, Hubertus. Grundstückswertermittlung: aus der Praxis - für die Praxis. Stuttgart: Wittwer, 2001. 229 p.;

Gomarasca, Mario A. Basics of geomatics / Mario A. Gomarasca. Dordrecht: Springer, 2009. 656 p. ;

Torge, W., Wolfgang, J. Geodesy. 4th ed. Berlin, Boston: De Gruyter, 2012. 433 p.;

Precise geodetic infrastructure: national requirements for a shared resource. Washington: National Academies Press, 2010. 142 p.;

Long, L. T. Acquisition and analysis of terrestrial gravity data. Cambridge: Cambridge University Press, 2013. 171. p;

Grafarend, Erik W. Optimization and design of geodetic networks. Berlin: Springer, 2012. 606 p.;

Усова, Н. В. Геодезия : (для реставраторов). Москва: Архитектура-С, 2006. 220 p.;

Шабалина, Л. А. Геодезия: учебное пособие для вузов, техникумов и колледжей железнодорожного транспорта. Москва: УМК МПС России, 2002;

Большаков, В. Ю. Геодезия. Изыскания и проектирование инженерных сооружений: справочное пособие. Москва: Недра, 1991. 237 p.;

Н. Н. Воронков и др. Геодезия. Геодезические и фотограмметрические приборы: справочное пособие. Москва: Недра, 1991. 428 p.;

Ю. К. Неумывакин, Е. И. Халугин, П. Н. Кузнецов, А. В. Бойко. Геодезия. Топографические съемки: Справ. Пособие. Москва: Недра, 1991. 315 p.

Database subscription contracts are concluded both directly with the supplier and through the "Cultural Information Systems Centre" state agency, which is the Latvian national representative of the international non-profit organisation EIFL (Electronic Information for Libraries, http://www.eifl.net/). The EIFL Licensing Programme offers national libraries subscriptions to internationally recognised databases at significantly reduced subscription fees not offered to individual subscribers, thus saving financial resources of the libraries.

The database subscriptions maintained by RTU Scientific Library

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

- 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.
- Databases financed by the Ministry of Education and Science available to RTU Scientific Library: ScienceDirect, SCOPUS (Elsevier), Web of Science.
- Latvian databases: LETA, Letonika, the Database of Latvian Standards (available on the premises of the Library).

Database usage at the Scientific Library of RTU has been growing since 2016. E-resource loans have increased from 75,391 to 525,194 items.

The new library premises have allowed to extend the range of services. Since the opening of the new premises in 2018, the number of visits to the library has increased from 103,825 to 235,600. The Scientific Library of RTU is open to everyone. The Central Library is open to users from Monday to Saturday. There is a 24/7 reading room. During the summer period, the Central Library is open every weekday with reduced opening hours. ((https://www.rtu.lv/lv/studijas/biblioteka/pakalpojumi-3)in Latvian)

The library sources are housed in an open-access collection. Books and periodicals according to the field of study and the UDC indexes are located in the central building of the Scientific Library, 5 Paula Valdena Street, Riga. The last copies of the oldest publications corresponding to the RTU profile are kept in the library repository. They are always available to the users.

The librarian on duty helps visitors find their way around the collection. Bibliographers (information specialists) provide more detailed information and advice. The library has a branch librarian service. ((https://www.rtu.lv/lv/studijas/biblioteka/nozaru-informacija) in Latvian).

The library resource search is supported by the Primo Discovery search tool (https://www.rtu.lv/lv/studijas/biblioteka/vienota-informacijas-meklesana) in Latvian. It allows searching the library catalogue (https://kopkatalogs.lv/F/?func=find-b-0&local_base=rtu01), the subscribed databases, as well as databases created by the RTU Scientific Library ((https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/bibliotekas-veidotas-datubazes)in Latvian) in one interface. Searching for information in the electronic joint catalogue (https://kopkatalogs.lv/F), it is possible to simultaneously obtain information on the resources available in 12 Latvian libraries. Both the electronic catalogue and the RTU portal ORTUS allow remote reservation of library resources, as well as remote access to the databases. Since the introduction of RFID technology, users can use five self-service book-dispensing machines and check out books from the pick-up machines around the clock.

The library provides students, academic personnel and other stakeholders with various levels of individual consultations and group training in information literacy ((https://www.rtu.lv/lv/studijas/biblioteka/lietotaju-apmacibas)in Latvian).

Publications not available in the library are delivered via an interlibrary loan or an international loan.

Internet access is available throughout the library. The library has copying, scanning, printing, binding services and a self-service dining room.

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

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

RTU funding from the state main budget consists of the base financing corresponding to a list of study programmes and the number of students, consisting of funds for utility payments, taxes, infrastructure maintenance (including the provision of data to the Register of Students and Graduates), the purchase of tools and equipment and personnel salaries, as well as financing for scientific activities.

The number of study seats is allocated upon discussions with the Ministry of Education and Science. The study base funding from the resources of the state budget is allocated to full-time studies. The amount of the study base funding is determined on the basis of the number of study seats specified by the state at RTU, as well as the base costs of the study seat determined by the state and the cost ratios of studies in thematic areas of education.

RTU funding from the state main budget for the provision of study seats for the relevant study year is allocated in accordance with the procedures specified in the RTU Senate decision “On the Methodology for Allocating and Spending the Main Budget, Performance Funding and Tuition Fees at RTU Organisational Units” for the respective academic year. This methodology is reviewed annually and approved in a new version, taking into account the necessary changes.

RTU has a decentralised budget and a separate budget is planned for each organisational unit. The budget is, in general, a revenue and expenditure plan for a specified period, work, measure or function. Revenues and expenses of RTU are managed on the basis of principles approved by the Senate or by the powers conferred on it by the Vice-Rector for Finance.

According to the Methodology, funding for organisational units is allocated either according to the financial or budget year, or immediately after receipt of funding. For RTU organisational units, a financial or budget year ranges from October to September of the following year, the following is

calculated and allocated for this time period:

- subsidy or main budget funding (educating students for the state budget means) is allocated as a monthly limit – 1/12 of the calculated annual funding is allocated to an organisational unit per month;
- tuition fee funding (educating the tuition fee paying students, including debtors' fees) is allocated twice a year (October and April) as a monthly limit – 1/6 of the calculated semester funding is allocated to an organisational unit per month;
- performance funding (research support funding) is allocated as a monthly limit – 1/12 of the calculated annual funding is allocated to an organisational unit per month;
- research base funding (research support funding) is allocated as a monthly limit – 1/12 of the calculated annual funding is allocated to an organisational unit per month.

Analysing the procedure of funding of study programmes at RTU in general, it is seen that the main budget and tuition fee funding from local students is determined in the long term on the basis of the fundamental principles established by the state. In the process of setting the volume of funding, the cost ratios of studies in thematic areas and the values of study costs according to the level of the study programme, as well as the number of students in the study courses are taken into account.

As mentioned above, it is possible, through the cost ratios of studies in the thematic areas of education, to determine the amount of funding needed to carry out the specific study programme and study course. The RTU Senate has confirmed that, in future, the cost ratios for studies in the thematic areas of education will be applied individually to each study course of the study programme, thereby providing an even more appropriate amount of funding for the implementation of study courses of the study programmes. In order to implement this system by the order of the Vice-Rector for Academic Affairs, an Expert Commission was established which identified a thematic area for each study course. The actual costs of the study programme “Geomatics” are as follows:

Academic year	Subsidy to the programme, EUR	Local student tuition fee for the programme, EUR	Foreign student tuition fee for the programme, EUR	Total funding for the programme, EUR	Cost per student, state budget EUR
2014/\2015	57815.43	0.00	0.00	57815.43	5799.03
2015/\2016	86620.25	0.00	0.00	86620.25	5799.03
2016/ 2017	116091.89	0.00	0.00	116091.89	5799.03
2017/ 2018	83689.55	0.00	0.00	83689.55	6060.99
2018/ 2019	79269.65	0.00	0.00	79269.65	6344.52
2019/ 2020	102164.10	0.00	0.00	102164.10	6607.56

2020/2021 grants prog. 120427,63EUR, Costs per 1 student 6694,22 EUR.

Financial resources of the study programme “Geomatics” are sufficient for the study programme implementation and their usage is controlled regularly both on the part of the administration, and on the part of RTU Vice-Rector for Finance.

Information on the minimum number of students in RTU study programmes is provided in the appendix of the self-evaluation report "On minimal number of students in study programmes".

Information on the funding distribution between the cost items is provided in the appendix of the self-assessment report "Funding distribution between the cost items".

The specific development of each study programme is the responsibility of each study programme director, as well as the faculty responsible. For the development of all study programmes, central funding is used for the renewal of the research library, improvement and maintenance of shared classrooms, public relations, programme marketing activities, development and maintenance of information systems related to the study process, development of the Ķīpsala complex and other activities.

3.4. Teaching Staff

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

Qualifications of the academic staff involved in the implementation of the study programme conform to the terms and conditions for the implementation of the study programme and the requirements of regulatory enactments. The employees elected to the academic positions at RTU, guest lecturers and Doctoral students are involved in the implementation of the study programme.

The study programme also involves staff working on different research projects, so that the knowledge acquired in the projects can be transferred to the study programme, having improved the content of study courses.

Currently, one guest lecturer participates in the implementation of the study programme, however, this number is variable since the study programme administration is interested in attracting academic staff from other universities. These academic staff representatives work at other universities and enterprises and conduct certain study courses of the study programme in the form of exchange, thus ensuring mutual cooperation not only at RTU, but also with other universities. Training and qualification upgrade of academic staff take place through participation in conferences and seminars, attending different courses, participating in the operation of other organisations, working as experts and consultants. Every year, academic staff take active part in methodological seminars organised by RTU and other universities.

The following academic staff members are involved in the implementation of the study programme:

Jānis Kaminskis, Dr.sc.ing., RTU Assoc. Prof., obtained and developed his professional scientific and pedagogic qualifications and competence at different universities in Finland, Denmark, Switzerland and now implements them in his academic, methodological and scientific research activities. Scientific interests of J. Kaminskis are related to different areas – geodesy, astronomy, gravimetry, land survey, geospatial information, civil engineering, both locally and internationally. Jānis Kaminskis is an engineering industry expert of the Latvian Council of Science in the field of construction, including geodesy and geoinformatics. Assoc. Prof J. Kaminskis is the author and co-author of over 95 scientific publications, including three books. Currently, he leads a number of Nordplus projects, including the following (from 2014 to 2022): Access to Geodetic Education for Society, No. NPHE-2014/10461; Geodetic Education Partnership, No. NPHE-2018/10380; Geodetic Education Partnership, No. NPHE-2019/10364 and Geodetic Education Build-up, No. NPHE-2020/10401. In addition to his main work, he is a member of the Presidium of the Nordic Geodetic Commission, chairs the Latvian National Association of Geodesy and Geophysics, acts as an academic member of the International Federation of Surveyors. ORCID iD https://orcid.org/0000-0001-6345-8084. The qualification of Assoc. Prof. Jānis Kaminskis complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study courses “Master Thesis with an engineering project”, and “Master Thesis”.

Mārtiņš Reiniks, Mg.sc.ing., Assist. Prof., Doctoral student. His interests involve geodesy, geodetic networks, laser scanning, unmanned aerial vehicles, engineering geodesy, remote exploration, global navigation satellite systems, spatial planning and land planning. M. Reiniks also works as a Manager at the Certification Centre of the Latvian Association of Surveyors, which performs conformity assessment and certification of the competence of surveyors (land survey, land cadastral survey and geodesic works. He is also a member of the Latvian Association of Surveyors, a member of the Geospatial Information Coordination Council and a member of the Surveying Advisory Council. He improves his qualification by attending conferences, seminars, including participation in different working groups. The qualification of Assist. Prof. Mārtiņš Reiniks complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study courses “Geodetic Networks”, “Topographic Mapping of Urban Area”, “Global Positioning Systems (study project)” and “Practical Placement”.

Olita Metuma, Mg.sc.ing., Assist. Prof. Her interests are related to geodesy, land management, land planning, territorial planning and real estate cadastre. She is a member of the Surveying Advisory Council and a member of the Latvian Association of Surveyors. The qualification of O. Metuma complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study courses, “Land Law”, and “Real Estate Management”.

Ints Lukss, Mg. phys., Lecturer. His range of interests is various information systems, including a large proportion of those related to the field of geomatics. There is also interest in unmanned aircraft, laser scanning and data processing, monitoring of different types and objects, software. He upgrades his qualification by participating in different seminars and conferences. The qualification of Ints Lukss complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study course “Fundamentals of Geomatic Data Processing”.

Lauris Goldbergs, Mg.sc.ing., Lecturer, Doctoral student. His research interests include photogrammetry, unmanned aerial vehicles, global ground observation systems, astronomy, remote exploration, software, geographic information systems. He is a member of the Latvian Association of Surveyors and the Latvian Astronomical Society. He ensures qualification for work with students by cooperating and obtaining experience with other universities and through regular participation in conferences, seminars and professional qualification upgrade courses. The qualification of Lauris Goldbergs complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study course "Computer Graphics in Geomatics".

Jānis Kokins, Mg.sc.ing, Lecturer. His research interests include topographical survey, land cadastral survey, land survey, measurement processing, geodetic networks, global navigation satellite systems, engineering geodesy, and geodesy. He is a member of the Board of the Latvian Association of Surveyors. He upgrades his qualification and ensures that topics are linked to students' interests, participates in different field-related qualification upgrade courses, seminars and conferences. The qualification of Jānis Kokins complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study courses "Topographic Mapping of Urban Area", and "Surveying Instruments".

Una Krutova, Mg.sc.ing., Guest Lecturer, Doctoral student. Her range of interests is surveying, cartography, databases, geographic information systems and their integration in the field of geomatics, open data. She takes part in the international project INTERREG CB "Coast4us" (1 January 2018–31 December 2020). She actively works at several organisations – as a Chairperson of the Board of the Latvian Association of Surveyors, as a member of the Board of the Latvian Association of Cartographers and Geodesists and the Latvian Association of Open Technologies. She also works at the Geospatial Information Coordination Council and at the Surveyal Advisory Council of the State Land Service. She upgrades her qualification by attending seminars, work groups, conferences, hackathons and professional qualification upgrade courses. The qualification of Una Krutova complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study course "Thematic Cartography".

Jānis Ancāns, Mg.sc.ing., Assist. Prof. The range of interests of J. Ancāns is geodesy, geodesic measurements, software, numerical models. He upgrades his qualification by attending seminars and conferences. The qualification of Jānis Ancāns complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study courses "Application Programs in Geomatics" and "Digital Terrain Models".

Jānis Zvirgzds, Dr.sc.ing., Assoc. Prof. Research interests of J. Zvirgzds are geodesy, geodetic measurements and calculations, geodetic networks, global navigation satellite systems. He upgrades his qualification by participating in different conferences, seminars and also GPS work groups of the European and national level. The qualification of Assoc. Prof. J. Zvirgzds complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study courses "Global Positioning Systems" and "GPS Heighting"

Rita Pētersone, Mg.biol., Lecturer. The sphere of interests of R. Pētersone is related to real estate valuation and land cadastral valuation. She upgrades her qualification by attending conferences, seminars and professional qualification upgrade courses. The qualification of R. Pētersone complies

with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study course “Real Estate Valuation”.

Iveta Stāmure, Mg.oec., Researcher, Doctoral student. Her interests pertain to issues related to real estate management, the construction sector, valuation of buildings and structures, building materials. She also works as a Real Estate Consultant at the company “Cēres nami” and the Latvian Association of Window and Door Manufacturers. She conducts practical classes in the study courses “Law on Construction and Rules on Construction” and “Valuation of Building Structures”. She is a co-author of the monographs “Financing Models for the Renovation of the Residential Fund in Latvia” and “Socio-Economic Aspects of the Interaction between Urban and Regional Development”. She upgrades her qualification regularly by attending seminars, conferences and professional qualification upgrade courses.

The qualification of I. Stāmure complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study courses “Real Estate Valuation” and “Real Estate Management”.

Airisa Šteinberga, Dr.psych., Associated Professor. Professional experience: pedagogical work experience in teaching and programme development of various psychological study courses at RTU (psychology, cognitive and social psychology, pedagogical psychology, etc.) for more than 25 years; elaborating pedagogical development programmes and delivering study courses for more than 10 years. Regular professional development, as a psychologist and a psychologist consultant, as well as long academic experience, allows in her work with students not only to enrich the content of study courses but also to supplement the diverse lectures, practical works and tasks to be performed independently with pedagogical style and personal attitudes. Research experience in joint projects with researchers of engineering institutes makes it possible to understand and use examples and terminology understandable to engineering students. The qualification of A.Šteinberga complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study course “Psychology”.

Alīda Zigmunde, Mg. philol., Dr. paed., Professor. Professional experience: pedagogical work experience at universities over 20 years, at RTU over eight years: in the history of engineering sciences over eight years, in teaching, developing and conducting programmes and teaching activities over three years. Regular professional development as an educator and participation in international conferences, as well as long academic experience, allows her in work with students to supplement the diversity of lectures, practical works and independent tasks, not only in terms of content, but also in terms of pedagogical style, educational knowledge in pedagogy, psychology and personal attitudes. Research experience in projects, cooperation with researchers of engineering and pedagogical institutes allow to understand and use examples and terminology understandable to engineering students. The qualification of A. Zigmunde complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study course “Pedagogy”.

Armands Auziņš, Dr. oec., Associate Professor, has developed a number of training methodological materials, over 20 international scientific articles in the field of land management. A. Auziņš is a member of the European Academy of Land Use and Developmento. His scientific interests relate to land management, land planning and surveying, as well as territorial development planning. He upgrades his qualification regularly by attending seminars, conferences and professional

qualification upgrade courses. Currently, he works within the project “A Values-Led Planning Approach for Sustainable Land Use and Development, Activity 1.1.1.2 “Post-doctoral Research Aid” of the specific aid objective 1.1.1 “To increase the research and innovative capacity of scientific institutions of Latvia and the ability to attract external financing, investing in human resources and infrastructure” of the operational programme “Growth and Employment” (No. 1.1.1.2/VIAA/1/16/161), 2017-2020.

The qualification of Assoc. Professor A. Auziņš complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study course “Fundamentals of Land Management” and “Real Estate Management”.

Māris Kaļinka, Dr.sc.ing., Assoc. Professor. He takes part in international projects such as INTERREG CB project “Coast4us” (1 January 2018–31 December 2020), “Height Precision Gravitation Model for Latvia, Including Sea Territory” (1 March 2018–up to now) and “Digital Platform iDārzs – For Sustainable Development of the Gardening Sector” (1 September 2019–up to now). He participated in projects such as “Development and Advanced Prefabrication of Innovative, Multifunctional Building Envelope Elements for MOdular REtrofitting and CONNECTions” (1 January 2014–1 January 2018). He is a Reviewer of the following scientific journals: The Baltic Journal of Real Estate Economics, Construction Management and Survey Review. M. Kaļinka’s scientific interest is related to urban planning, introduction of digitisation in construction and urban management, geodesy, databases, geographic information systems, laser scanning, photogrammetry and land planning. M. Kaļinka is the author and co-author of several scientific publications. He actively participates in various conferences, professional training courses, working groups, workshops, hackathons that increase his professional qualification. The qualification of Assoc. Prof. M. Kaļinka complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study courses “Geographical Information Systems”, “Geodetic Data Processing”, “Terrestrial Photogrammetry” and “Remote Sensing”.

Jānis Ieviņš. Dr.sc.ing., Professor. His scientific interests lie in labour safety issues. He is the author and co-author of many scientific publications. J.Ieviņš upgrades his qualification by participating regularly in seminars, conferences and professional qualification upgrade courses. The qualification of J. Ieviņš complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study course “Basics of Occupational Safety”.

Out of the aforementioned academic staff, A. Auziņš, M.Kaļinka, J. Kaminskis, J. Zvirgzds, L. Goldbergs, J. Klīve work with foreign students.

Additional information:

In general, the data show the qualifications of academic staff. According to the qualifications, the quality of study courses can be ensured by the academic staff. Many members of the academic staff also work directly in the geodesic and cartographic sector, thus transferring the skills and competences of practical work to the study programme.

Currently, there is one guest lecturer working at the study programme. Such academic staff members work at other universities but also conduct certain courses in the form of exchange in the study programme, thus ensuring cooperation not only within RTU but also with other universities.

3.4.2. Analysis and assessment of the changes to the composition of the teaching staff

over the reporting period and their impact on the study quality.

The academic staff holding a degree of Doctor of Engineering Sciences and lecturers or highly qualified professionals with the relevant work experience, whose characteristics are provided in their CV, participate in the process of implementing the professional Master study programme. The academic staff CVs are given in the Annex. Academic staff comply with the requirements for the implementation of study courses. This is demonstrated by both their characteristics and CV, as well as by their scientific and methodical publications and the participation in scientific and methodical conferences organised internationally, by RTU and the Faculty of Civil Engineering.

Characteristics of the academic staff are provided in the table:

No	Parameter	Number	Proportion, %
1.	Positions:		
	Professors	1	7.7
	Associate professors	5	38.5
	Assistant professors	1	7.7
	Lecturers	4	30.8
	Researchers	1	7.7
	Lab staff	1	7.7
	Total:	**13**	**100**
2.	Scientific degrees:		
	Dr.sc.	6	46.2
	Mg.sc.	7	53.8
	Total:	**13**	**100**
3.	Age:		
	below 30	2	15.4
	31 - 40	1	7.7
	41 - 50	6	46.2

	51 - 60	3	23.1
	above 60	1	7.7
	Total:	**13**	**100**

In general, the data show the qualifications of academic staff. According to the qualifications, the quality of study courses can be ensured by the academic staff. The number of academic staff members who have obtained the Doctoral degree has not changed during the reporting period. There are professors and associate professors working at the study programme, ensuring that 46.2% of academic staff members hold a Doctoral degree. A number of lecturers with more than 20 years of practical work experience continue their advancement at Doctoral studies. A number of instructors also work directly in geodesy and cartography, thus transferring the skills and competences of practical work to the study programme. Analysing the age structure of academic staff involved in the implementation of the programme, the number of academic staff members holding a Doctoral degree who are above 60 has decreased, i.e., currently they make 7.7% of the total number of academic staff. The number of academic staff who have reached the age threshold of 41-50 has increased, i.e., 46.2% of the total number of academic staff. The study programme administration attracts Doctoral students to participate in the implementation of the study programme. At present, their number is 3, representing 23.1% of the total number of academic staff.

The academic staff involved in the flow of students of the programme has the appropriate language proficiency level necessary for the implementation of the study programme. The study programme administration is addressing the problem of proving language proficiency as the RTU Senate made a decision on the procedure for language recognition. As a result, the number of guest lecturers working at international companies has decreased, as they are not aware of the procedure developed by RTU for proving language levels by passing IELTS or TOEFL tests. In general, the data show the qualifications of academic staff. According to the qualifications, the quality of study courses can be ensured by the academic staff. A number of lecturers work in parallel directly in the real estate sector, thus transferring practical skills and competences to the study programme.

Currently, four guest lecturers are engaged in the implementation of the study programme. These academic staff representatives work at other universities and enterprises and conduct certain study courses of the study programme in the form of an exchange, this way ensuring mutual cooperation not only at RTU, but also with other universities. Training and qualification upgrade of academic staff takes place through participation in conferences and seminars, attending different courses, participating in the operation of other organisations, working as experts and consultants. Every year, academic staff take active part in methodological seminars organised by RTU and other universities.

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

has the status of an expert and expiration date of the Latvian Council of Science expert) (if applicable).

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

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

The interrelation among the study courses and their logical, sequential learning are essential to achieving the learning outcomes of the study programme. In general, a framework has been established to promote cooperation between faculty and university staff, which provides regular academic conferences and professional training seminars for the development of methodological competencies. An example is the academic conference of 27 April 2018 entitled “Integration of Methodological and Scientific Work into the Study Process”. Such measures contribute to the development of the academic staff and promote more efficient cooperation in achieving results and improving study courses.

The study programme carried out by the Department of Geomatics is interdisciplinary. The content of the programme consists of civil engineering, geodesy, geoinformatics, cartography, land survey, geography, other cross-sectoral engineering, geophysics and environmental protection. As a result, academic staff from different organisational units are involved in the implementation of study courses and professionals in the sector are attracted. For example, academic staff of the Department are involved in the implementation of the study course “Fundamentals of Geomatics”, while individual themes are presented by invited guest lecturers from industry enterprises.

Practical classes within the study course are implemented by academic staff together with professionals from the industry. Guest lecturers from the industry leading companies are invited to deliver the study courses, for example, leading specialists of LTd. Metrum, project managers of Ltd. GeoStar, consultants of Ltd. GPS Partners, experts from the State Land Service and Rural Support Service, as well as leading specialists from the Latvian Hydrographic Service, various specialists in geospatial information systems and others.

Cooperation among academic staff is also demonstrated by the fact that prior to the beginning of the semester, academic staff meet, consult and agree on the content so that there is no duplication of the curriculum of the study courses.

The sequence of study courses is followed to progress from the simplest and general education to a more complex and professional level, enabling interlinking and improving development to be ensured, as well as reaching certain degree of specialisation. After each semester, the department responsible for the study programme implementation evaluates the progress of the study process and the learning outcomes at a meeting. Student surveys on the quality of study courses play an important role in this process. Based on an analysis of the current situation, solutions are found. For example, adjustments have been made to the structure of individual study courses in order to avoid partial duplication and improve interconnection between the study courses, or changes to the content of the study programme have been proposed for its development.

Annexes

III - Description of the Study Programme - 3.1. Indicators Describing the Study Programme		
Sample of the diploma and its supplement to be issued for completing the study programme	Diplomu paraugiLV_Eng.zip	Diplomu paraugiLV_Eng.zip
For academic study programmes - Opinion of the Council of Higher Education in accordance with Section 55, Paragraph two of the Law on Higher Education Institutions (if applicable)		
Compliance of the joint study programme with the provisions of the Law on Higher Education Institutions (table) (if applicable)		
Statistics on the students in the reporting period	Annex 5.pdf	5. pielikums.pdf
III - Description of the Study Programme - 3.2. The Content of Studies and Implementation Thereof		
Compliance with the study programme with the State Education Standard	Annex 6.docx.pdf	6.pielikums.pdf
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard or the requirements for professional qualification (if applicable)	Annex 7.pdf	7.pielikums.pdf
Compliance of the study programme with the specific regulatory framework applicable to the relevant field (if applicable)	Compliance the specific regulatory framework.pdf	Atbilstība specifiskajam normatīvajam regulējumam.pdf
Mapping of the study courses/ modules for the achievement of the learning outcomes of the study programme	8.pielikumsENG.pdf	8.pielikumsLV.pdf
The curriculum of the study programme (for each type and form of the implementation of the study programme)	Annex 9.pdf	9.pielikums.pdf
Descriptions of the study courses/ modules	Annex 10.pdf	10.pielikums.pdf
Description of the organisation of the internship of the students (if applicable)	Internship_Management_Procedure[7678].pdf	Prakses_organizesanas_kartiba[7679].pdf
III - Description of the Study Programme - 3.4. Teaching Staff		
Confirmation that the academic staff of the doctoral study programme includes not less than five doctors, of which at least three are experts approved by the Latvian Council of Science in the branch or sub-branch of science in which the study programme intends to award a scientific degree (if applicable)		
Confirmation that the academic staff of the academic study programme complies with the requirements specified in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions (if applicable)		

Engineering of Regional Development and Urban Economics (42581)

Study field	*Architecture and Construction*
ProcedureStudyProgram.Name	*Engineering of Regional Development and Urban Economics*
Education classification code	*42581*
Type of the study programme	*Professional bachelor study programme*
Name of the study programme director	*Maija*
Surname of the study programme director	*Šenfelde*
E-mail of the study programme director	*maija.senfelde@rtu.lv*
Title of the study programme director	*Dr.oec.*
Phone of the study programme director	*29184578*
Goal of the study programme	*to provide professional bachelor education in engineering of regional development and urban economics, in order to ensure an adequate theoretical knowledge and skills that allow graduates to do development planning engineer's work on a professional level, as well as to continue education in master study programs and enhance professional competence.*
Tasks of the study programme	*1. to provide competitive second-level professional higher education that corresponds to international standards and train students for practical work;* *2. to provide students with a comprehensive knowledge of the economic development of the territory and the engineering aspects of urbanization process and urban economics, and impact on regional development, build professional skills and to develop their competences in accordance with labour market requirements;* *3. promote interest in further education, and the development of professional knowledge;* *4. to encourage student interest in public processes, to stimulate students ' development as positive, responsible and legally competent personalities who can act independently and autonomously take decisions;* *5. ensure that the content of the study programme, the process of studies and scientific research development and changes comply with the specific field and international practice;* *6. to promote academic staff and student interaction between scientific research and the practical use of the results obtained;* *7. to foster and develop academic staff and student exchange and participation in international projects.*

Results of the study programme	*Having completed the study program, graduates are able:* *1. to perform duties responsibly and independently in accordance with the requirements of the regulatory enactments in the field of territorial development planning of the Republic of Latvia and the legal norms of the European Union;* *2. to plan, organize, control and assess territory development processes;* *3. to perform economic calculations related to the sustainable development of the cities and regions;* *4. to comprehend the problems associated with the maintenance of the engineering and technical infrastructure and to participate in the development and implementation of the infrastructure projects;* *5. to implement the green economy policy for the sustainable development of the region;* *6. to plan, develop and assess the budget process at the local, regional and state level;* *7. to apply special territory planning software;* *8. to develop and implement both local and international projects for the solution of the region development issues;* *9. to ensure the compliance to the norms and regulations of the occupational safety, fire safety and environment protection;* *10. to creatively cooperate with clients, entrepreneurs, specialists, etc.;* *11. to conduct research of scientific value, to interpret and analyze its results on the issues related to territory development and urban economy.*
Final examination upon the completion of the study programme	*Bachelor Thesis Including Project*

Study programme forms

Full time studies - 4 years - latvian

Study type and form	*Full time studies*
Duration in full years	*4*
Duration in month	*0*
Language	*latvian*
Amount (CP)	*160*
Admission requirements (in English)	*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 Engineering of Regional Development and Urban Economics*
Qualification to be obtained (in english)	*Engineer in Development Planning*

Places of implementation

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

3.1. Indicators Describing the Study Programme

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

Since the previous accreditation of the study direction, 2 parameters have been changed for the professional bachelor study program “Regional Development and Urban Economics Engineering”. Implementation in English is excluded because there was no demand from foreign students due to the specifics of the program, as well as the form of part-time studies is excluded because it was not financially sustainable due to the small number of students. At this moment, all part-time students have completed the program.

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

Professionals educated within the scope of the study direction “Architecture and Civil Engineering” involve in processes aimed at improving, maintaining and transforming the quality of the living space of the society, and implementation of the study programs comprised therein is based on complex knowledge and understanding of the interaction of technical, social and economic factors in creating sustainable environment. Therefore, the professional bachelor's study program “Regional Development and Urban Economics Engineering” is organically included in the mentioned field of study, and on January 23, 2012, the Higher Education Program Licensing Commission assigned it the code 42581.

The study program corresponds to the 6th level of the EQF and LQF, thus it is envisioned for school leavers with general secondary education or 4-year vocational secondary education. The name of the study program is related to its ***aim*** to provide professional bachelor education in engineering of regional development and urban economics, in order to ensure an adequate theoretical knowledge and skills that allow graduates to do development planning engineer’s work on a professional level, as well as to continue education in master study programs and enhance professional competence.

In order to achieve the set aim specific ***tasks*** have been put forward to reach certain learning ***outcomes*** (see Study program parameters). The aim of the study program is achieved if students in the study process reach the learning outcomes. By its curriculum, the study program is designed in such a way that the aims and learning outcomes of the study courses included therein are subject to and ensure that the overall aim and learning outcomes of the program are achieved.

Professional Bachelor Degree in Engineering of Regional Development and Urban Economics and Qualification of Engineer in Regional Development are awarded after the acquisition of theoretical study courses of the study program, acquiring practical skills during the placement and the public presentation of the Bachelor Thesis in the State Examination Commission. Having analyzed the interrelation between the name of the study program, the degree and professional qualification to be obtained, the aims, objectives, learning outcomes, as well as the enrolment requirements, it can be concluded that it is in place. Enrolment requirements comply with the regulations adopted in Latvia

Professional standard "Engineer in Development Planning" (code 2164 09) was approved at the meeting of the Tripartite Sub-council for Cooperation in Vocational Education and Employment, Minutes No. 7 of 15 September 2011 https://registri.visc.gov.lv/profizglitiba/dokumenti/standarti/ps0471.pdf (in Latvian). The profession is recognized as an interdisciplinary profession, and this status has been approved by the Construction Industry Expert Council of the Employers' Confederation of Latvia. It will not be included in any industry map.

According to the Cabinet Regulation No. 626 of 9 October 2018 (Minutes No. 46, §15) "Regulation on the List of Mandatorily Applicable Professional Standards and Requirements for Vocational Qualifications and Procedures for the Publication of Professional Standards and Requirements for Vocational Qualifications Included therein" on 8 April 2021, the Latvian Association of Local and Regional Governments submitted the revised professional standard "Engineer in Regional Development" to the National Centre for Education with a request to include it in Chapter 5 – professions of Level 5 of Professional Qualifications (corresponds to Level 6 of the Latvian Qualification Framework). The decision of the Tripartite Sub-council for Cooperation in Vocational Education and Employment is expected in December 2021.

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

The professional bachelor study program "Regional Development and Urban Economics Engineering" has been implemented since 2012. The topicality of the program was determined by the need to solve the problems of regional development in Latvia, to carry out administrative-territorial reform, as well as to promote the strengthening of the role of local governments. The study program focuses on the training of specialists needed for Latvia who would have interdisciplinary knowledge, which is essential in addressing urban and regional development challenges. The program is closely related to the development of territories, and the teaching staff of the faculties of Architecture and Civil Engineering plays an important role in its implementation. By involving lecturers from several faculties, it allows to successfully use the potential of RTU.

Analyzing the employment of graduates, it should be noted that they are mainly employed in municipal development departments and construction boards, design companies, public administration institutions and organizations related to regional development. Ministry of Environmental Protection and Regional Development, State Regional Development Agency, "Metrum" Ltd., "Grupa 93" Ltd., the City Development Department of Riga Municipality, city councils of Jelgava, Liepāja, Ventspils, Jūrmala; county councils of Tukums, Limbaži, Aizkraukle, Ikšķile, Ķekava, Sigulda, Garkalne, Mārupe can be mentioned among them. Many students find their job already during the internship.

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

The statistical data on the students of the study program can be found in Annex 5. Having analyzed these data, it can be concluded that in the reporting period the total number of students has decreased: 73 students in 2017/18 academic year and 53 students in 2020/21 academic year. There are two main reasons for this dynamic. Starting from 2017, there was no admission to part-time studies. The decision was made not to worsen the quality of studies. In part-time studies, classes were planned for a small number of students on Saturdays, and it was difficult to ensure qualified teaching staff from different faculties, as well as the involvement of visiting teachers. In turn, the decrease in the number of own funding students can be explained by the increase in tuition fees and the demographic situation in the country. At this moment, all part-time students have completed the program.

The graduate number dynamics is linked to the number of students in the last study year. At the beginning of the study program, only 5 students were matriculated on state budget funds. Later, the number of budget seats increased in general, but every 4 years a smaller number of students graduate from the program, because the mentioned cycle was repeated.

Having analyzed student dropout rate, it can be concluded that the main reason for expulsion is poor academic performance results, which is particularly noticeable at the beginning of studies. This points to the fact that students have not had the required level of prior knowledge, to be able to take math and physics courses. Much fewer students are expelled at their own will. This usually happens due to health issues and family circumstances. In some rare cases, students do not renew for studies after an academic leave. There are also situations when students are expelled before the development of the Bachelor Thesis, if a student understands that he or she will not be able to develop the Thesis in good quality in time due to heavy workload. In this case, the student completes the program usually next year.

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

3.2. The Content of Studies and Implementation Thereof

3.2.1. Analysis of the content of the study programme. Assessment of the interrelation between the information included in the study courses/ modules, the intended learning outcomes, the set aims and other indicators with the aims of the study course/ module and the aims and intended outcomes of the study programme. Assessment of the

relevance of the content of the study courses/ modules and compliance with the needs of the relevant industry, labour market and with the trends in science on how and whether the content of the study courses/ modules is updated in line with the development trends of the relevant industry, labour market, and science.

Having analyzed the compliance with the Cabinet Regulations No 512 “Regulations on State Standard of Second Level Professional Higher Education” adopted on August 26, 2014, it can be concluded that the professional bachelor study program “Engineering of Regional Development and Urban Economics” meets the requirements of the standard. Annex 6 provides comparison of the study program with the requirements of the standard.

The content of the study program is constantly updated and improved in line with the latest trends in economics, urban economics and regional development, as well as the situation in the labour market and its requirements. In order not to lose its topicality, the study program regularly undergoes bigger or smaller changes, consisting in replacing study courses or supplementing the program with new topical courses. The changes are discussed and approved by the Committee of the Study Field “Architecture and Civil Engineering” and submitted for approval by the Faculty Council. In addition, academic staff take into account the development trends in urban and regional development, particularly concentrating on problems in Latvia in the implementation of their study courses and reflect them during the classes. For example, the academic staff of the study course “Urban and Regional Socio-economic Problems” discuss topical challenges of urban and regional development with students and organize debates, propose report topics on topical problems such as sorting of waste, negative impacts of traffic and pollution, smart cities and the like. As the issue of refugees in the European Union is getting more and more urgent, the impact of refugees on urban and regional development was analyzed. Field studies are regularly carried out in various areas of Riga – Torņakalns, Āgenskalns, Bolderāja, etc. The surveys include topical urban development issues on availability of services, waste-sorting facilities, availability of public transport, the current statistics are collected. The study course “Fundamentals of Regional Planning and Forecasting” focuses on the issues of ongoing administrative territorial reform, while the study course “Planning of Territorial and Urban Infrastructure” addresses the relevant challenges in this area. Influenced by this study course several students have chosen to study the impact of the Rail Baltica project on the development of territories in their Bachelor Thesis. The issue of the use of renewable energy resources is raised by the study course “Sustainable Regional Energy Supply”. In addition, within the study courses Kaspars Zakulis, the director of JSC Latvijas Zaļais punkts discussed the developments in waste management and Juris Pūce, Minister of Environmental Protection and Regional Development discussed administrative territorial reform and its role in urban and regional development.

The opinion of graduates and employers is of great importance for the improvement of the content of the program. Particularly close cooperation has developed with representatives of Ministry of Environmental Protection and Regional Development (Department of Regional Policy) and Latvian Association of Local and Regional Governments.

Students also participate in the development of the study curricula by filling out surveys at the end of each semester and evaluating the curricula of the study courses and the quality of their implementation. A meeting with the director of the study program and the leaders of student groups takes place once a semester, where topical issues of the study process are addressed. These meetings are recorded.

The following examples illustrate the development of the program. In March 2017, with an aim to

develop student research skills and strengthen the research component of the program, it was supplemented with the study course “Topicalities of Nowadays Economy (study work)”. In April 2019, the study course “Fundamentals of Geomatics” was replaced by the study course “Fundamentals of Land Management” which gives more added value to the program. The program was supplemented with a topical study course “Intercultural Communication”. In April 2021, study course “Computer Science (basic course)” was replaced by a more modern study course “Business Intelligence Technologies”, while the program was supplemented with study courses “Territorial and Detailed Planning, its Development Strategies”. Taking into account students’ recommendations, the study course “Accounting and Finances” was replaced by more extensive course “Fundamentals of Finances” with the aim of strengthening students' knowledge in the field of finance and investment.

The structure and content of the professional Bachelor study program “Engineering of Regional Development and Urban Economics” is designed to achieve its aim. The aim of the study program is closely related to all 11 defined learning outcomes. These learning outcomes are achieved in the course of acquisition of study courses. Thus the aims set in the descriptions of the study courses are closely related to the learning outcomes of the entire program, but study courses are interrelated and complement each other in order to achieve the expected results upon completion of the program. Interrelation of these study courses to the learning outcomes of the study program is illustrated in the mapping of the study courses (see Annex 8).

To ensure successful achievement of study program results, the syllabus for the implementation of study courses follows a specific sequence. The study program plans for full-time studies are attached in Annex 9 .

Descriptions of the study courses are included in a unified RTU study course register. Descriptions of the study courses included in the professional Bachelor study program “Engineering of Regional Development and Urban Economics” are attached in Annex 10 . In total, there are descriptions of 31 Compulsory Study Courses (A), 18 Compulsory Elective Study Courses (B), Internship (D) and Final Examination (E).

Professional standard “Engineer in Regional Development ” (code 2164 09) was approved at the meeting of the Tripartite Sub-council for Cooperation in Vocational Education and Employment, Minutes No. 7 of 15 September 2011. The profession under discussion can be considered an interdisciplinary profession, and this status has been approved by the Construction Industry Expert Council of the Employers’ Confederation of Latvia.

According to the Cabinet Regulation No. 626 of 9 October 2018 (Minutes No. 46, §15) “Regulation on the List of Mandatorily Applicable Professional Standards and Requirements for Vocational Qualifications and Procedures for the Publication of Professional Standards and Requirements for Vocational Qualifications Included therein” on 8 April 2021, the Latvian Association of Local and Regional Governments submitted the revised professional standard “Engineer in Regional Development” to the National Centre for Education with a request to include it in Chapter 5 – professions of Level 5 of Professional Qualifications (corresponds to Level 6 of the Latvian Qualification Framework). The decision of the Tripartite Sub-council for Cooperation in Vocational Education and Employment is expected in December 2021.

Appendix 7 provides comparison of the study program with the requirements of the revised standard. It can be concluded that the content of the program meets its requirements.

3.2.2. In the case of master’s and doctoral study programmes, specify and provide the

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

Not relevant.

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

At the level of professional Bachelor studies, the development of professional competences is of particular importance so that they can be applied in practice, thus making the graduate competitive on the labor market. However, good vocational education must be based on a sound basis of theoretical knowledge; thus, the study process is organized in such a way that students acquire both theoretical and practical knowledge. Therefore, a variety of forms of training are used: lectures for knowledge transfer, discussions, situation analysis, practical tasks (case studies) for knowledge strengthening and tests for knowledge testing and interaction. For example, when solving tasks, students are offered to join forces and address challenges in small groups, but after the given time period jointly examine the results and discuss typical errors or uncertainties. Students' skills to work with databases and selecting the necessary information are also developed. Moreover, students' skills to process statistical data are strengthened. In line with the level of student preparedness, tasks of increased complexity are also offered. Guest lectures from industry experts and company representatives are organized on a regular basis.

It should be noted that much emphasis is placed on replacing the learning style with "teaching to learn". Therefore, individual and group research work is widely used. When working in groups and sharing their responsibilities among themselves, students should find, select and process statistical data on economic indicators in order to characterize and compare economic situation of the countries. In this case, based on the acquired theoretical knowledge at the lectures and performed standard tasks at the practical classes, students are able to apply the acquired knowledge and skills in practice. Moreover, when conducting this kind of analysis (usually in Microsoft Word or PowerPoint format), students also learn to design the material according to the requirements. By implementing different types of group work, students are guided towards self-sufficiency, increasing responsibility and promoting mutual respect.

The practice of presenting to the audience research conducted by students is widely applied, which then is followed by discussion. This helps develop different skills (students improve their communication, presentation and analytical skills, as well as the skill of respecting opinion of other students) and strengthen the previously acquired theoretical knowledge.

In the study process, an advanced learning method, such as applied games, is also used, which promotes the involvement of students in the learning process and encourages creativity. For example, the study program includes the applied game “Model for the Functioning of the Economic System”. The implementation of this study course helps develop different types of skills (students develop their communication, presentation and analytical skills, as well as their skills to respect the views of their peers) and strengthen previously acquired knowledge in the field of economic processes and entrepreneurship, in order to gain a more complete picture of how the economic system of the market as a whole works and how its subjects interact in the circumstances of information asymmetry. Mostly, students’ opinion about the course is very positive. Students also note the value of the method, which helps to better understand how market economy works, and how information asymmetry tends to influence participants’ actions and hinder the achievement of the objectives pursued.

Interest in research, as well as development of student competencies in this area, is already being promoted from the first year of studies. Following the acquisition of micro and macroeconomic courses, students develop study project within the study course “Topicalities of Modern Economics”. Students choose a topical problem and devote their research to it. Students’ skills in working with databases, selecting the necessary information and analyzing scientific articles are also developed. Moreover, students’ skills to process statistical data are strengthened.

Students of the professional Bachelor study program “Engineering of Regional Development and Urban Economics” conduct research on particular urban territories by recording the facts and interviewing residents. As a result, an interesting visual material with a collection of data is elaborated and after that are available at the Faculty. It is also binding for other students, but the main aim of such research is to show the ability to assess the strengths and weaknesses of certain neighborhoods, as well as to identify the main problems and find possible solutions. Such study trips unite students and develop their creativity.

A summative evaluation system is used for the final assessment within the study courses – the final mark is formed of several components, thus during the semester students are already affecting their final grades. The evaluation criteria for the study courses and individual/home tasks are published in advance in ORTUS e-learning environment. The assessment of home tasks, assessment tests, reports, presentations and other tasks performed during the semester is assigned a certain percentage of the final grade. The examination grade must not exceed 50% of the final assessment. Academic staff can also take into account and evaluate the attendance of the classes.

The academic staff determine the assessment structure for their study course, but it must strictly correspond the Resolution of RTU Senate that the examination grade must not exceed 50% of the final assessment. An example of this is an approach where the academic staff, in order to promote the attendance of classes and to ensure continuous knowledge testing, enables students to earn additional points after 2-3 classes by solving small tasks and analyzing case studies on previously discussed topic. From the points earned during the semester, a small percentage (10 to 20) is added to the final grade. Given that students know the deadlines for the submission of individual/group/home tasks, if, for justified reasons, the student is not able to attend the class, he or she has the opportunity to submit the task in ORTUS e-learning environment in a timely manner in order to obtain an assessment.

Another example is an initiative of the academic staff at the end of the semester before the exam tutorials to offer students to write questions that the student wants to be answered or explained in a shared document (usually using the Google Docs). The answers can be provided not only by the academic staff but also by other students. On the one hand, this helps students to better prepare

for the exam, because not all students will dare to ask any questions during the tutorial, whereas when writing anonymously they can find out more. On the other hand, it also enables academic staff to help students prepare for the final examination in a timely and more comprehensive manner, and helps clarify what aspects should be addressed more in the upcoming periods in implementation of these courses.

All academic staff members must dedicate at least 2 academic hours each week for tutorials in which students can communicate with them and receive answers to questions.

The results of the Professional Bachelor Study Program "Engineering of Regional Development and Urban Economics Economics" student knowledge assessment are discussed twice a year in the meetings of the Department of the Territorial Development Management and Urban Economics, which is responsible for the study program's record keeping. The results are collected and assessed also by the administration of the study program. Together with the results of student surveys, they are used as a basis for further development of the study process.

Having analyzed study implementation and evaluation methods used in the study program, it can be concluded that the student-centred principles have been taken into account:

- student enrolment and the diversity of their needs is taken into account and respected in the development of appropriate learning modes;
- different ways of implementing the program have been used;
- based on students' abilities and needs, academic staff apply diverse pedagogical techniques and promote student's strife for independence, while at the same time ensuring supervision and support from the academic staff;
- implementation of the study process in the program contributes to mutual respect between students and academic staff, as the principle of democracy is applied and the program administration takes into account opinions of students.

The organization and quality of the student evaluation system are essential for the implementation of student-centred education. Having analyzed and assessed this system in the study program, it can be concluded that:

- the evaluation methods and criteria for grading have been published in advance in ORTUS e-learning environment, the academic staff inform students about them at the beginning of the study course, and the conditions referred to the above are well known to students;
- evaluation is consistent, fair, suitable for all students and implemented in accordance with the approved procedures;
- the evaluation reflects the learning outcomes, and students are given the opportunity to receive feedback;
- the academic staff develop their pedagogical skills at academic conferences and seminars to improve the evaluation of teaching methods and learning outcomes.

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

outcomes of the study programme (if applicable).

According to Cabinet Regulations No 512 “Regulations on State Standard of Second Level Professional Higher Education” adopted on August 26, 2014, internship is a mandatory requirement for the professional Bachelor study program. The amount of practice must be at least 20 credit points. Students of the program “Engineering of Regional Development and Urban Economics” implement an internship in the amount of 26 credit points. Until July 1, 2019, the internship was implemented in accordance with the regulations approved by RTU Senate on March 29, 2010 (Minutes No 539) and in accordance with the regulations of the structural unit implementing the study program.

The aim of the internship is to enable students to use theoretical knowledge acquired during their studies in practical work at a specific company/organization and to promote university cooperation with companies and organizations by finding out their needs in a specific field of study. As a result, students develop their skills and competences as well as they are given the ability to integrate in the labor market. The volume of the internship is 26 credit points and it is divided into two parts: 18 CP are provided for the 3rd year spring semester, but 8 CP for the 4th year spring semester. As students undergo internship before elaborating the Bachelor Thesis, it provides a good opportunity to link the internship to the Bachelor Thesis and collect data for its development.

Description of the internship can be found in RTU study course register. Description provides the internship aim, main tasks, as well as learning outcomes. They are all organically related to the aim of the study program as a whole and the learning outcomes to be achieved in the study process. In addition to the internship description, regulations on internship have been elaborated for students of professional Bachelor study program “Engineering of Regional Development and Urban Economics”. The internship is coordinated by a member of academic staff appointed by the University, but it is supervised by an employee assigned by the internship company. During the internship, students elaborate an internship report, which contains the summary and analysis of the research results, and at the end of the internship, these results are publicly presented. The administration of the study program regularly improves the program and tasks of the internship in close cooperation with employers and internship supervisors, as well as following the trends in development of economics and regional development.

Feedback and assessment from employers and internship supervisors at companies/organizations show that the knowledge, practical capacity and skills acquired by students meet the requirements of the State Standard of Second Level Professional Higher Education and the occupational standard. In general, assessments of internship are positive – from 7 (good) till 10 (outstanding). The main conclusions of internship supervisors and employers on student knowledge and work are as follows: students are determined, dutifully perform internship tasks, individual students stand out with the ability to introduce innovative solutions for identification and prevention of company problems, students are able to quickly fit into the work of company’s team and work groups, perform assigned duties with a high sense of responsibility, demonstrate the skill of using theoretical knowledge in a real work environment, perform the assigned tasks within the set deadlines, are not afraid of new challenges, students have very good skills in working with computer and the commonly used software. The knowledge of some students has been assessed satisfactorily but their attitude to assigned responsibilities and their desire to develop in the chosen profession have been assessed positively.

Since 2017/2018, 59 full-time students and 14 part-time students have undergone internship. Places of internship are very different, however, local governments, public authorities and

organizations related to regional development dominate. Ministry of Environmental Protection and Regional Development, State Regional Development Agency, “Metrum” Ltd., “Grupa 93” Ltd., the City Development Department of Riga Municipality, city councils of Jelgava, Liepāja, Ventspils, Jūrmala; county councils of Tukums, Limbaži, Aizkraukle, Ikšķile, Ķekava, Sigulda, Garkalne, Mārupe can be mentioned among them.

During the internship, students conduct research related to the specific nature of the study program. The research focuses on issues related to infrastructure of cities and regions, budget, territorial development, impact of specific businesses on aspects of territorial development. They identify problems, conduct research and offer solutions to the problems. Generally, students choose places of internship taking into account their own interests and desires, but if necessary, RTU Career Support and Service Centre can assist in finding a place of internship. Cooperation agreements have been concluded with several local governments to ensure internship. Many companies and organizations themselves offer places of internship to the University.

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

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

At the end of the professional Bachelor study program “Engineering of Regional Development and Urban Economics”, students develop a Bachelor Thesis including project. The Bachelor Thesis is publicly presented in the State Examination Commission. The Commission acts in accordance with the resolution approved by RTU Senate and composition of the Commission is approved by the resolution of the Rector.

According to the requirements regarding the State Examination Commission in professional study programs, labor market representatives participate in the work of the Commission. Currently representatives of the Ministry of Environmental Protection and Regional Development, the Ministry of Health, Jelgava City Council, Mārupe County Council and Latvijas Zaļais punkts, Ltd. are members of the Commission.

Description of the Bachelor Thesis can be found in RTU study course register. Description provides the thesis aim, main tasks, as well as learning outcomes. They are all organically related to the aim of the study program as a whole and the learning outcomes to be achieved in the study process. In addition to the description, regulations on Bachelor Thesis have been elaborated for students of professional Bachelor study program “Engineering of Regional Development and Urban Economics”.

The development and public presentation of the Bachelor Thesis allows assessing how the aim and learning outcomes of the study program have been achieved in the study process. At this stage of the education process, the student must use the whole set of knowledge, skills and competences he/she has acquired while studying at the program. Elaborating Bachelor Thesis, students demonstrate the research skills acquired during their studies, as well as the ability to work with

international scientific databases available in RTU library with an electronic access through ORTUS e-learning environment. Bachelor Thesis is a serious research developed according to the topic chosen by the student. The topic has to be topical and must correspond to the specifics of the program. The scientific advisor of the Bachelor Thesis is advised by the Director of the Study Program based on the interests and competencies of the academic staff in the relevant field. The topics of the Bachelor Thesis are discussed at the meeting of the Department and a draft of the Dean's resolution is drawn up. The topics of the Bachelor Theses and their scientific advisors are appointed by the resolution of the Dean.

The developed Bachelor Theses should reflect their relevance to the learning outcomes of the program. Student must understand the organizational principles of urban development planning and regional development assessment criteria and methods; the issues of economic development and national economic policy; the factors of economic development regionally, as well as identify and eliminate potential risks; the planning and maintenance of engineering infrastructure in urban and rural areas, as well as traffic flow planning principles; carry out economic calculations/feasibility studies related to sustainable development of towns and regions; assess the impact of social and political processes on urban and regional development; plan, implement and evaluate the budgetary process at a local and regional level; as well as implement "green economy" policies for sustainable development of regions and towns.

Every year in April RTU Student Scientific and Technical Conference is organized. Students who have to publicly present their Bachelor Thesis in summer participate in this conference. They present their research and the results achieved. It strengthens their scientific research skills, develops the ability to speak in front of the audience, engage in discussions and answer questions. These skills are developed during the studies, because students have to elaborate several study projects. In 2018, 19 students participated in the 59th RTU SSTC; in 2019, 6 students participated in the 60th RTU SSTC; in 2020, 15 students participated in the 61st RTU SSTC; while in 2021, 14 students participated in the 62nd RTU SSTC. To participate in the conference, students must submit abstract of their research, which is published in the e-environment. The best conference participants in each section are awarded.

Having analyzed the topics of publicly presented Bachelor Theses, it can be concluded that they mainly focus on problems of regional and urban development in Latvia in close context with aspects of national economy and development of its sectors, which corresponds to the aims and tasks of the study program. For example, "Opportunities for the Development of Riga Technical University Ķīpsala Student Campus", "Possibilities for the Development of Parking Facilities in Residential Area in Riga", "Analysis and Optimization of Transportation Network of Universities in Pardaugava", "Significance of Improving the Quality of Jelgava Urban Space in the Development of the City", "Potential Impact of Rail Baltica Project on Development of Salaspils", "Impact of Event Infrastructure on Development of Sigulda", "Slums in Old Riga and Assessment of their Impact on Urban Environment", "Development Opportunities for the Surrounding Infrastructure of Lake Titurga", "Determination of Development Potential of Mežciems Housing Estate in City of Daugavpils", "Evaluation of Investment Projects for Revitalization of Tourism Objects in City of Jūrmala" etc.

Publicly presented Bachelor Theses and their topics demonstrate that the studies carried out are relevant for both development of specific municipalities and territories, and the country in general. Graduates of the study program are competitive on the labor market. With few exceptions, everyone works according to the specific nature of the acquired education, while some even hold leading positions at public administration and municipal institutions.

Having analyzed the assessment of the Bachelor Theses, it can be concluded that a majority of

graduates earn grades 9 (excellent) – 32.5% and 8 (very good) – 42.5%. 10% of Bachelor Theses have earned grade 7 (good). In the reporting period, 2 students have earned grade 10 (outstanding). In this case, the graduate has indeed shown a high level of knowledge and the ability to focus on the subject, as well as demonstrated a deep understanding of economic processes. 7.5% of graduates have earned grade 6 (almost good), and only 2.5% have earned grade 5 (satisfactory). None of the graduates have earned the lowest positive grade. It should be noted that the overall level of publicly presented Bachelor Theses is rather high and this trend remains stable.

3.3. Resources and Provision of the Study Programme

3.3.1. Assessment of the compliance of the resources and provision (study provision, scientific support (if applicable), informative provision (including libraries), material and technical provision, and financial provision) with the conditions for the implementation of the study programme and the learning outcomes to be achieved by providing the respective examples.

Study programs of the Faculty of Engineering Economics and Management are implemented in a modern environment that meets the requirements. The study process is organized at RTU buildings in Riga: 6 Kalnciema Street and Ķīpsala campus. 90% of the teaching, scientific and administrative work of RTU FEEM is carried out in the FEEM building on 6 Kalnciema Street, which was commissioned on 29 August 2008. All study rooms designated for the study process are equipped with multimedia facilities – computer with Internet access and speakers, OHP, some rooms are also equipped with interactive boards. Since autumns 2019 HP Shareboard system was introduced in many lecture rooms, which allows projecting the notes written on the board to the screen. Therefore, it is possible to ensure modern and high quality study process.

There are the following premises in the building at 6 Kalnciema Street:

- 4 lecture rooms (120 seats, all equipped with multimedia facilities) which are used to organize lectures;
- 10 lecture rooms (up to 70 seats, equipped with multimedia facilities) are used for lectures and practical classes;
- 6 lecture rooms (from 20 to 40 seats, equipped with multimedia facilities) can be used mainly for practical classes, individual or group work, language studies;
- 3 computer rooms (86 seats, equipped with multimedia facilities).

Each member of academic staff has a personal computer and a well-equipped workplace.

In order to improve the learning environment at RTU, an ambitious project “RTU – City within a City” is currently being carried out, which envisions creation of the most advanced engineering study center in the Baltic region – student campus, which in the future will include RTU faculties, administrative buildings and Scientific Library, thus providing more convenient services.

Students studying at the program and the academic staff will have access to the comprehensive and modern RTU Scientific Library. RTU Scientific Library is the oldest university library in Latvia, whose strategy and aims are primarily related to the aims and tasks of RTU. Library provides subscription to more than 20 databases (see the list of all databases here:

http://www.rtu.lv/content/view/388/1337/lang,lv/) (in Latvian).

A special literature database has been developed for the needs of the study field which has been compiled in accordance with the suggestions and recommendations of the academic staff and the students. This database is available on 5 Paula Valdena Street, as well as using e-resources. The Library provides access to the following databases: LETA, Letonika, EBRARY, EBSCO, Latvian Standards Database, ScienceDirect, SpringerLink, World Scientific WSPC, RUBRICON and other. Students of the study program "Engineering of Regional Development and Urban Economics" mainly use the following databases: EBSCO, LETA, Science Direct, Scopus, Web of Science. Since 2018, students of the faculty have access to database Bloomberg Terminal. The library has an overnight reading room, which is appropriately equipped, and is accessible to students after registration in ORTUS e-learning environment.

RTU Scientific Library was one of the first in Latvia to introduce RFID technologies, thus becoming a modern and contemporary university library. One of the most significant innovations that made the library more convenient for students is the self-service machine to take out and return books. This means that students no longer have to stand in line, and they can receive and return books without the librarian. In the library, students have access to the newest periodical publications, statistical materials, books, conference materials on economics and business. Every year, the library's funds are supplemented by both teaching and scientific literature and periodical publications used in the study process. For the needs of the study program, each year funds are allocated for the purchase of literature, and academic staff order the necessary publications.

Other elements of RTU infrastructure, such as canteens and cafeterias, copying facilities, student hostels, RTU sports and leisure centers, the swimming pool, and other facilities are available for the needs of the students and the academic staff. Vending machines selling snacks and drinks are installed in RTU premises.

The technological infrastructure of the premises is continuously updated, new resource rooms and study laboratory rooms are equipped, new office equipment, study literature and computers for the needs of the study process are purchased, and other activities are performed.

Currently, there are three computer rooms at the disposal of the Faculty with 86 (46+25+15) equipped seats. Students of the study program "Engineering of Regional Development and Urban Economics" are provided with Microsoft Office, EViews and other software programs required for acquisition of the study program. All students and academic staff have the opportunity to use free WiFi network in all premises of RTU FEEM.

In academic year 2017/2018, eight portable computers, two new monitors and two laser printers were purchased for the academic staff of the Department of Regional Development Management and Urban Economics in order to provide a more convenient and modern working environment and to improve work quality.. New dimming blinds were installed on the windows of academic staff rooms.

Since the beginning of the emergency situation, online lectures have been delivered with the help of MS Teams, Zoom, WebEx platforms. RTU provides for full use of Teams and Zoom (full license packages were purchased for all teaching staff). More than 100 portable computers were purchased to ensure remote work for the academic staff. Supportive events and informative workshops were organized for the teaching staff and students in order to help them adapt to the remote learning process. Support was provided in the form of training materials, webinars on the tools and methodology for the teaching staff and psychological support to the students.

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

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

Information on the principles and methodology of financial allocation is provided in Section 2.3.1 of the report.

State budget subsidies and student tuition fees are used to finance the implementation of the professional Bachelor study program “Engineering of Regional Development and Urban Economics”. The information on the financial resources of the study program is shown below:

Academic year	State budget subsidies, EUR	Tuition fees, EUR	Total funds, EUR	Costs per 1 student, EUR
2017./2018.	80 803.70	23 012.57	103 816.27	3 065.33
2018./2019.	84 189.83	20 820.00	105 009.83	3 208.72
2019./2020.	109 362.03	16 400.00	125 762.03	3 341.76
2020./2021.	122 878.39	14 165.00	137 043.39	3 385.58

From the analysis of the given information it can be concluded that the state budget subsidies have tended to increase in the reporting period, while local student fees have decreased. It can be explained by the economic and demographic situation in the country. Costs per 1 student over the reporting period have increased due to the improvement of infrastructure, as well as the overall increase in RTU costs, taking into account objective reasons (public utilities payments, building maintenance, etc.).

Information on the minimum number of students in RTU study programmes is provided in the appendix of the self-evaluation report "On minimal number of students in study programmes".

Information on the funding distribution between the cost items is provided in the appendix of the self-assessment report "Funding distribution between the cost items".

The available funding ensures the implementation of the study program, as well as is used for its development. Every year, funds are allocated for the purchase of literature in the library, development and maintenance of information systems related to the study process, the study

material and technical base is improved (see Section 3.3.1), as well as it becomes possible to involve highly qualified specialists as guest lecturers in the study process. Since the beginning of the emergency situation, online lectures have been delivered with the help of MS Teams, Zoom, WebEx platforms. RTU provides for full use of Teams and Zoom (full license packages were purchased for all teaching staff).

3.4. Teaching Staff

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

Highly qualified academic staff are involved in the implementation of professional Bachelor study program “Engineering of Regional Development and Urban Economics”. Despite the fact that this is a professional program, 69.7% of the elected academic staff have a Doctoral degree. Academic staff from RTU Faculty of Architecture, Faculty of Civil Engineering and Faculty of Electrical and Environmental Engineering participate in the implementation of the program. Such an approach ensures the inter-disciplinarity of the program. The aim of administration of the program, by selecting and recruiting academic staff, is to maximize the effectiveness of the study program and to enable students to achieve the envisaged learning outcome.

The following elected academic staff (32 lecturers) are involved in the implementation of the study program:

Auziņa-Emsiņa Astra, Dr.oec., Assistant Professor. Professional experience: 17 years of academic work experience at higher education institution. Scientific activities and research are also carried out for more than 15 years, specializing in economic and sectoral analysis, modelling of external trade, competitiveness and productivity, assessment of interindustry ties, development of macroeconomic, macroeconometric and multisectoral models, as evidenced by participation in scientific projects and research programs, participation in international scientific conferences and publications. Expert of Latvia Council of Science. Membership in industry associations – Board member of the Latvian Association of Econometrists, member of the International Input-Output Association, member of INFORUM modeling group, founder and member of the Association of Latvian Young Scientists, etc. Students master methods and solutions for economic and sectoral analysis and modelling, carry out practical modeling of macroeconomic processes, scenario development and forecasting. The latest and most up-to-date scientific studies and their results, topicalities in other countries are integrated in the study process.

Auziņš Armands, Dr.oec., Associate Professor, has developed several textbooks, over 20 international scientific articles in the field of land management. A.Auziņš is a member of the European Academy of Land Use and Development (EALD). His research interests relate to land management, land planning and surveying, as well as planning for the development of territories.

He regularly upgrades his qualification by attending seminars, conferences and professional qualification upgrade courses. Currently, he is working at the project “A values-Led Planning Approach for Sustainable Land Use and Development. Activity 1.1.1.2 “Post-doctoral Research Aid” of the specific aid objective 1.1.1 “To increase the research and innovative capacity of scientific institutions of Latvia and the ability to attract external financing, investing in human resources and infrastructure” of the operational program “Growth and Employment” (No. 1.1.1.2/VIAA/1/16/161). The qualification of Assoc. Professor A. Auziņš complies with the study program implementation requirements and those of regulatory enactments, as well as ensures the achievement of tasks and learning outcomes of the study program and the study courses “Territorial and Detailed Planning, its Development Strategies” and “Fundamentals of Land Management”.

Balabka Normunds, Mg.oec., Mg.peda, Mg.jur. Assistant Professor at Professional Programs. The work at the higher education institution is closely related to the organizational and management work at Ulbroka Secondary School, Stopiņi Municipality, as well as fulfilment of the duties of the member of municipal council. The professional activities in Stopiņi municipality are thematically closely linked to the program of the study course “Territorial Economic Activity” and its curricula, which generally help ensure high-quality implementation of the study course.

Bartušauskis Jānis, Mg.OS., Lecturer. Education: Master's degree in Occupational Safety, qualification of senior labor protection specialist, obtained at Riga Technical University. In addition, attended various local and international courses (Nord +, Sweden), seminars, professional and scientific conferences, during these actions enhanced knowledge of the latest industry and scientific trends. Professional experience: A teaching staff member with more than 14 years of experience at university has participated in research projects (Ventspils Grain Terminals Impact on environment assessment project, etc.). The development of research skills is ensured by writing scientific articles. During the study process, students develop and improve their skills in research and analysis of results, which ensure achievement of study goals in various group works, research projects and case studies. During these years, several awards were received from the Faculty and the Student Parliament for my professional work in the study process.

Budņiks Leonards, Mg.oec., Assistant Professor at Professional Programs. ICF certified professional couch, Microsoft certified Excel Expert. He implements study courses that are related to management of information technologies and information systems, develops data processing tools in Ms Excel and Power Bi environment. The lecturer constantly participates in local IT conferences and forums, online courses and seminars. He is interested in the impact of information technologies on the society and the economy. The research interest concerns the management of information technologies and systems in small and medium-sized enterprises, the concept of open data and the research on the social consequences of IT development.

Čaupale Renāte, Dr.arch., Assistant Professor. She has a Doctoral degree in architecture, subfield theory and history of architecture. Professional experience: Research component in work with students is ensured by regular participation in scientific conferences and elaboration of publications. Guest lectures in other countries (Poland, the Czech Republic) ensure acquisition of knowledge about the current tendencies in the industry, promote improvement of methods, allow gaining and sharing experience, as well as establishing cooperation.

Gaile-Sarkane Elīna, Dr.oec. Professor. Academic and scientific work experience at RTU more than 20 years. In addition to a doctoral degree in economics she has Bachelor degree in engineering (Bachelor degree in chemistry), which provides an excellent basis for academic and research work in innovation, management and business areas, therefore scientific research of prof. focuses on interdisciplinary areas covering management science, innovation management, technology transfer and different aspects of business. The author of over 150 scientific

publications in management, economics and related areas. More than 35 of them are published in internationally recognised editions or at conferences with indexing in international databases (for example, Thomson and Reuter, Scopus, EBSCO, etc.). The author and/or co-author of 4 textbooks, 3 monographs, 1 patent. Expert, researcher or project leader in 7 international projects (over 20 projects in total since 2001) promoting interdisciplinary, international cooperation with an important contribution to the improvement of the Latvian education system.

Gorbunova Kristīne, Mg.oec., Assistant Professor at Professional Programs. Extensive academic work experience at university, as well as professional work experience at a municipal public transport company. Participation in scientific conferences ensure research competence in work with students. She is a co-author of a scientific monograph on municipal development issues. RTU teacher qualification courses and FEEM academic conference on the integration of teaching methods and scientific work into the study process have been attended. In addition, participation in various workshops ensures knowledge about the latest trends in the sector, encourages the acquisition of new methods that enable students to learn the topicalities of the sector.

Greitāne Rita, Dr.oec., Assistant Professor. Every year, professional advancement activities in the field of project management are undertaken, for example, on 31 October and 7 November 2018, a workshop “Project Management Workshops” organized by the KIC was attended and a certificate was obtained. In academic year 2018/19, a project “Survey on the Satisfaction of Railway Passengers with the Quality of Railway Services in Latvia in 2018” initiated by the State Railway Administration (contract No. 03000-3.1.2.-e/54.) was carried out with students, 50 students and 1134 respondents participated in the project, thus developing project management skills. By participating in scientific and academic conferences, the latest developments in the field of project management are effectively integrated by Rita Greitāne into the study process.

Gušča Jūlija, Dr.sc.ing., Associate Professor. Research and project management in climate technologies, resource and waste management, environmental performance assessment of products and processes. In the period from 2004 to 2012 work experience in international companies and organizations in the field of environmental protection and energy AS Ramboll, UN Development Program. Since 2011 she has been working on the board of the environmental education association "Nature Concert Hall". Representing RTU, participates in several advisory councils of ministries. In the bachelor study program she is responsible for the implementation of the study course “Environmental protection and recycling processes” as well as participates as a scientific supervisor in the development of bachelor's theses.

Jaunzems Dzintars, **Dr.sc.ing, Assistant Professor.** More than 12 years of experience in the fields of energy efficiency, energy supply, renewable energy and climate policy both internationally (eg UN international expert on sustainable energy and climate policy) and locally (eg Vidzeme planning region energy planning expert). This type of experience allows for the successful transfer of extensive and applicable knowledge based on research and practical experience. In addition, involvement in various projects of the national research program, such as "Energy and climate modeling towards carbon neutrality", as well as in a number of European Union Horizon 2020 projects, such as "SUNShINE Accelerate, ABRACADABRA - Assistant Buildings’ addition to Retrofit, Adopt, Cure And Develop the Actual Buildings up to zeRo energy,Activating a market for deep renovation” etc. Scientific research activities have been summarized in more than 25 scientific publications. The activities, knowledge and experience gained so far make it possible to create training content that is engaging and provides a broad range of knowledge relevant to the sustainable development of energy supply.

Judrupa Ilze, Dr.oec., Associate Professor. She is the author of a number of scientific publications on regional competitiveness, assessment of quality of life, smart specialization at the

national and regional level, remote work. She is a co-author of the scientific monograph “Evaluation of Regions’ Competitiveness in Latvia” (2018), which is used in the study process. The conducted research and information collected are incorporated into lectures and complement theoretical material with practical examples and methods for evaluating regional development and competitiveness. This contributes to the ability of students to understand factors of economic development, both internationally and regionally, as well as to the ability to carry out economic calculations related to sustainable regional development and competitiveness assessment. She has participated in a number of international projects.

Jurgelāne-Kaldava Ingūna, Dr.oec., Associate Professor. Professional experience: researcher and head of several international projects. Research component in work with students is ensured by participation in scientific conferences and development of publications in internationally recognized collections of scientific articles and journals, etc. For publications, different research methods are used, including statistical, which allow presenting the results of research to students. She is a co-author of the textbook “Economic Statistics”. In the implementation of the study course, a variety of teaching methods are used that allow students to learn the acquisition, compilation and analysis of statistical information in the field of a particular study program, using the latest information and data.

Kaļinka Māris, ,**Dr.sc.ing., Associate Professor**. Works at the projects of international significance INTERREG CB, project “Piekraste mums [Coast4us]” (01.01.2018 – 31.12.2020), etc. Research interests include urban planning, the introduction of digitization in construction and urban management, land planning. Author and co-author of a number of scientific publications. The qualification complies with the study program implementation conditions and the requirements of regulatory enactments, as well as ensures the achievement of objectives and learning outcomes of the study program and the study courses “Fundamentals of Territorial Planning” and “Computer Graphics in Territorial Planning”.

Kamola Līga, Mg.oec., Mg.sc.educ. She has completed Doctoral studies as a candidate for a scientific degree at academic program “Management Science and Economics” and continues writing her Doctoral Thesis. In addition, knowledge of the latest industry and scientific trends is gained at various local and international courses, seminars, professional and scientific conferences. Professional experience: academic staff member for more than 10 years at university, participant of research projects. By developing the Doctoral Thesis and writing scientific articles, her research skills are developed. In the study process, her students develop and improve their skills in research and analysis of results to ensure that the learning outcomes are achieved.

Kamols Uldis, Mg.oec., Dipl.oec., Assistant Professor at Professional Programs. Professional experience: internal auditor at the state administrative institution for 3 years, project manager in supervision of implementation of projects co-financed by the European Union for 3 years, senior manager at the Development Instruments Department of the Ministry of Regional Development and Local Government for more than 2 years. Previous professional experience and qualification help achieve learning outcomes, as well as supplement the theory with practical examples of projects co-financed by the EU and the socio-economic development of cities. The complete achievement of learning outcomes is supported by both acquired expertise in project management, project development and practical experience in evaluating and monitoring projects co-financed by the EU and identifying urban socio-economic challenges. The involvement in scientific research is related to the implementation of EU co-financed projects in Latvia and their role in the development of the country, as well as the socio-economic development of cities in Latvia. The results of the conducted research are used in the study process, as well as students are involved in research to better understand study courses.

Lapiņa Inga, Dr.oec., Professor, More than 23 years' experience in higher education: in study process management, research, quality assessment and international project management. She has participated in education system development as an expert, researcher and project manager in more than 20 projects and studies. She has extensive international experience in quality assessment, including participation in expert groups of the Centre for Quality Assessment in Higher Education of Lithuania and International Quality Accreditation (IQA) CEEMAN. She has significant experience in Latvian and international organizations. Her scientific activities, closely linked with her pedagogical and research expertise, contribute to the growth of students in her study courses. She has published over 60 scientific articles, researches, methodological and strategic documents in the field of quality management.

Liokumoviča Irina, Dr. philol., Assistant Professor. Philologist, instructor of the English Language in the context of economics. Participation in international scientific conferences with reports (e.g., international scientific conference "Linguistic, Didactic and Sociocultural Aspects of Language Functioning", Vilnius, Lithuania (2018), international scientific conference "XXVIII Scientific Readings" Daugavpils University, Faculty of Humanities (2018) etc.) allows gaining and sharing knowledge. Participation in the academic project "Partnership for Education and Research about Responsible Living (PERL)" provides the acquaintance with the latest tendencies in industry and, thus, promotes acquisition and use of modern methods.

Malahova Jeļena, Dr.oec., Associate Professor. Research component in work with students is ensured by active participation in professional advancement seminars, scientific conferences and elaboration of publications. Active participation in different projects and scientific contract work. Within the study process, students gain topical information in accordance with Cabinet of Minister Regulation No 716 "Minimum Requirements for the Content of the Mandatory Civil Protection Course and the Content of Civil Protection Training for Employees".

Mihņenoka Aleksandra, Mg.oec. Lecturer. The competences of Aleksandra Mihņenoka to conduct lectures and practical classes are regularly improved. As a result, within the teaching activities, the lecturer implements the principles of student-centred education, which is based on different teaching methods, both traditional and interactive. She is an active member of Association "Creative Ideas". She has participated in multiple international projects to promote entrepreneurship. She has industry-relevant scientific publications, also included in Scopus and ISI Web of Science databases. She has participated in scientific conferences. Research experience allows promoting students to get involved in research within the acquisition of the study course and elaboration of final project, by collecting and analyzing scientific articles on relevant topics and using different research methods. In May – July 2019, within the European Social Fund Project No 8.2.2.0/18/A/017 "Development of the Academic Personnel of Riga Technical University" lecturer underwent a traineeship at companies (total of 200 hours), which allowed gaining new experience, improving communication skills. Providing opportunity to give real examples to students ensures a more complete understanding of theoretical material by linking the theory to the actual practical examples, the real situation in the company and industry.

Ose Daina, **Dr.jur., Assistant professor,** Lawyer, Barrister. Practical experience in dealing with economic disputes in court. When working with students the practical experience and knowledge gained in professional advancement courses are used. Publications in specialized journals and participation in problem discussions allow for an in-depth analysis and approbation of research results in studies. Studies of court and case law raise awareness of the aspects of the theoretical issues. This contributes to an in-depth understanding of the relation between theory and practice. Within the study course, students present a practical problem, exploring in more detail the theoretical regulation, doctrine and case law, and involve fellow students in the discussion of the problem.

Ozolzīle Gunārs, Dr.sc.soc., Associate Professor. Professional experience: since 1989 teaching social sciences at RTU (Sociology, Politology and Political System of Latvia) and other higher education institutions in Latvia (University of Latvia, Latvian Academy of Sport Education, Police Academy of Latvia, College of Business Administration and Institute of Social Technologies); since 2005 Chairman of the State Examination Commission at Bachelor and Master study program "Sociology of Organizations and Public Administration" at the Faculty of Economics and Social Development of University of Life Sciences and Technologies. From 1991 till 2018, he was a Researcher at market and public opinion research company Baltic Studies Centre Ltd. Research link with students is also ensured by scientific research work in projects funded by the Latvian Council of Science, the Ministry of Defence and the EU, participation in conferences and development of scientific publications. Research activities have mainly been linked to research into the stability and efficiency of the Latvian political system, as well as the possibilities for reforming individual political institutes. Such research contributes to increasing the quality of the implemented study courses and to ensuring links with national political processes. Regular methodological work – development of teaching tools and other methodological materials – to increase efficiency of study work.

Plotka Kaspars, **Mg.oec., Researcher, PhD student.** Professional experience in the public and private sector, as well as teaching experience at higher education institution. Participation in scientific conferences, development of scientific publications. The experience gained makes it possible to successfully implement study courses related to the public sector economics, public sector investment and the circular economy. Active doctoral studies, participation in scientific conferences and the development of publications, as well as participation in the work of the state administration as a consultant, provide scientific research and practical components in the work with students.

Pola Aija, Mg.math., Lecturer. Professional experience: academic work for more than 20 years. Participation in scientific and methodological conferences and seminars, as well as elaboration of publications ensure constant professional advancement. Knowledge of mathematics, probability theory and other fields of mathematics is taught to students with an aim to apply the acquired knowledge in the field of regional development and urban economics, which later is used as the necessary applicable mathematical methods in the development of the Bachelor Thesis.

Semjonova Nadežda Dr.oec., Assistant Professor. Research work, elaboration of scientific articles, participation in international conferences and various seminars ensure the conformity of the qualification in accordance with the requirements for the implementation of the study program and regulatory enactments. Involved in the Post-doctoral research support project, which enables co-operation with other European universities and the Association of the Latvian Manufacturers of Medicines. Expert on state and local government finances, author of the scientific monograph "Government Debt: Evaluation of Financial Security and Optimal Policy Selection" (2017).

Survilo Tatjana, Dr.oec., FEEM Associate Professor. Professional experience: research work at the Institute of Economics, Latvian Academy of Sciences and other research institutions for more than 25 years; Head of the Department of National Economy (4 years) at Riga City Latgale suburb municipality, as well as at RTU for nearly 25 years. Participation in scientific conferences and elaboration of publications ensure research component in work with students. Co-author of a scientific monograph on municipal development issues.

Šatrevičs Vladimirs, Dr.oec. Assistant Professor. He has worked on international and local projects, for example, on "Project 5.2.2 Innovations and Business Development in Latvia according to Smart Specialization Strategy", "EU Policies Impact to the Transformations of the Higher Education and Research System in Norway and Latvia". He regularly enhances his competence by attending workshops, conferences and professional training courses. Qualification of V. Šatrevičs

meets the requirements of the study program and regulatory enactments, it also provides for achievement of the aims and learning outcomes of the study program and the study course “Strategic Management”.

Šenfelde Maija Dr.oec., Professor. Long-lasting experience of academic and administrative work at the university. Expert of Latvia Council of Science. Author of four issues of the textbook “Macroeconomics” and author of a number of scientific monographs in the field of economics. Active participation in scientific conferences for improvement of competences, professional advancement in different courses and seminars. Participation in the annual economic conferences organized by the Bank of Latvia, as well as in the “Expert Talks”. The experience and continued professional advancement ensure the ability to provide students with the necessary theoretical knowledge, as well as to inform students about the most topical challenges in macroeconomics, national economy, international economy and their potential solutions, which in turn develop students’ ability to assess economic, social and political processes in the world and their impact on the Latvian economy. Participation in international projects as project leader and researcher.

Šņitņikovs Aleksejs, Dr. sc. soc., Assistant Professor, conducts study course “Sociology of Management”. Professional experience: extensive research experience in the field of sociology, gained at UL Institute of Philosophy and Sociology (8 years), and participation in both fundamental and applied projects. Research experience in the field of counselling has been acquired in cooperation with private research companies (Safege Baltija Ltd.), including in policy assessment projects, evaluating public administration policies, as well as the effectiveness of the use of EU funds. In the course of the development of the Doctoral Thesis, he underwent traineeship at Copenhagen Business School (2010-2011). Professional contacts with this university are maintained, within the framework of the Erasmus Mobility Program in 2018 and 2019 he visited Copenhagen Business School. Research interests are related to organizational sociology. Research results are used in the elaboration and implementation of study courses.

Treija Sandra, Dr.arch., Professor. Professional experience: 4 years of experience at the Board of Urban Development at Riga City Council’s City Development Department. Teaching experience: 23 years of experience at RTU Faculty of Architecture in different academic positions, member of the Latvian Union of Architects and member of its Council. Expert of Latvia Council of Science: scope of research – architecture, urban planning, sustainable development, urban ecology, urban landscape residential environment. National group coordinator at international organization Docomomo. Research is mainly related to sustainable urban development, housing issues, quality of life in terms of environment, urban regeneration issues. Professional, academic and research activities provide a complex view on topical urban planning problems, which gives advantage in the study process to focus on both theoretical and practical tendencies in industry.

Vanags Jānis, **Dr.oec., Dipl.ing., Professor.** Professor’s scientific and academic interests lie in the Latvian national economy, engineering economics, construction and house management and real estate management and real estate evaluation, economics of real estate, microeconomic and macroeconomic processes, sustainable development. Author of numerous scientific publications, including 5 books, and the co-author of the monograph “Financing Models for Housing Fund Renovation in Latvia” and “Socio-Economic Aspects of the Interaction of Urban and Regional Development”. In parallel to his work at the University, he works as a consultant for “Consalis" Ltd. Qualification meets the requirements of the study program and regulatory enactments, it also provides for achievement of the aims and learning outcomes of the study program and study course “Investments in Real Estate”.

Vrubļevskis Artūrs, Dr.sc.ing, Assistant Professor. Academic and scientific work experience at the Massachusetts Institute of Technology (USA), Ventspils University of Applied Sciences and

RTU over 10 years. Author of several scientific publications, participation in international projects. This type of experience allows for the successful transfer of extensive and applicable knowledge based on research and practical experience. The qualification complies with the study program implementation conditions and the requirements of regulatory enactments, as well as ensures the achievement of objectives and learning outcomes of the study program and the study course “Physics .

Academic staff of the study program are also actively involved in scientific research, which allows improving the quality of studies. The experience and knowledge gained allows improving the competences of academic staff, as well as enriching the discussions organized in the audience and providing students with knowledge of current industry challenges in the world.

For example, ***Professor M.Šenfelde*** has led INTERREG IVC project No 1097R4 “MICROPOL – Smart Work Centres in Non-metropolitan Areas” (2012-2014), as well as FLLP-2011 / 26 project “Optimization of National Development Planning Process”, and has participated in the work group of INTERREG Europe project PGI00304, CLUSTERS3 - “Leveraging Cluster Policies for Successful Implementation of RIS3”; ***Professor S.Treija*** has participated in international and local research projects, including - “Technological Solutions for Energy Efficiency of Buildings”, State Research Program; “Cities & Rail: Increasing potentials for Smart & Just Cities”, the Swedish Institute; “BuildDigiCraft”, Erasmus+; “European Middle Class Mass Housing”, COST action CA18137; “Implementing Nature Based Solutions for Creating a Resourceful Circular City”, COST action CA17133; ***Asist.Professor D.Jaunzems*** is involved in various projects of the national research program, such as "Energy and climate modeling towards carbon neutrality", as well as in a number of European Union Horizon 2020 projects, such as "SUNShINE Accelerate, ABRACADABRA - Assistant Buildings’ addition to Retrofit, Adopt, Cure And Develop the Actual Buildings up to zeRo energy,Activating a market for deep renovation” etc.; ***Professor E.Gaile-Sarkane*** has participated in the State Research Program EKOSOC–LV project 5.2.7. “Involvement of the Society in Social Innovation for Providing Sustainable Development of Latvia” 2014-2018; ***Associate Professor Ilze Judrupa*** has participated in INTERREG IVC project No 1097R4 “MICROPOL – Smart Work Centres in Non-metropolitan Areas” (2012-2014), project “Smart Specialisation Opportunities for Vidzeme Planning Region” funded by Norwegian Financial Instrument, as well as Erasmus+ project “Shake up Start ups”; ***Associate Professor J.Malahova*** has participated in scientific contracts “Development of a Single Environmental Risk Plan for Jelgava and Siauliai” contract No JPD2018/85/MI, “Assessment of the Technological Process of Granules Manufacturing Plants in Inčukalns, 34 Plānupes Street” contract No 1-3.31/016/2015; ***Assistant Professor V.Šatrēvičs*** has worked on international and local projects, for example, on “Project 5.2.2 Innovations and Business Development in Latvia according to Smart Specialization Strategy”, “EU Policies Impact to the Transformations of the Higher Education and Research System in Norway and Latvia”; ***Assistant Professor at Professional Programs N.Balabka*** has led a project “Stopiņi Region Education Development Strategy 2018-2022” and participated in Ulbroka Secondary School and Daugavpils University project “Clicking with Voters” funded by EU program “Europe for Citizens”; ***Assistant Professor N.Semjonova*** with ERAF support implements project “Innovative Medical Devices Commercialisation Methodology and Evaluation of Manufacturing Financing Model”; ***Lecturer A.Mihņenoka*** in 2017 and 2018 participated in Erasmus+ project “ Creative Start-Ups in Rural Areas (Rural Buzz)” 2017-1-LV02-KA205-001502.

Participation in the INTERREG IVC project “Micropol – Smart Work Centers in Non-Metropolitan Areas” and information on remote work centers in different European countries obtained during the project and acquired knowledge about the topical issues of the EU employment policy in the field of distance work has been incorporated in the study course “Current Trends of the European Union Economic Policy”. Participation in the Norwegian Financial Mechanism project “Smart Specialization

Opportunities for Vidzeme Planning Region" has also enabled I.Judrupa to broaden her knowledge of the nature of smart specialization and the principles of developing a smart specialization strategy, as well as the EU position in this field. The knowledge acquired has resulted in the updated study course "Current Trends of the European Union Economic Policy". The monograph by I.Judrupa and M.Šenfelde "Latvijas reģionu konkurētspējas novērtēšana" ("Evaluation of Competitiveness of Latvian Regions"), published in 2008, is used in study courses, which cover topical issues of regional development and competition.

The involvement of Associate Professor at a professional study program U.Kamola in scientific research is related to the implementation of EU co-financed projects in Latvia and their role in the development of the country, as well as socio-economic development of Latvian cities. The results of the research are used in the study process and students are involved in research by developing study projects. Such an approach allows for a better understanding and acquisition of study courses.

Assist. Professor N.Semjonova, with the support of ERDF postdoctoral research, is implementing the project "The Methodology for the Commercialization of Innovative Biomedical Devices and the Evaluation of the Productions Financing Model" (No.1.1.1.2/VIAA/2/18/348. 2019–2021), which provides for the transfer of good practice, the unity of theory and practice, and the acquisition and exchange of experience on current issues in the sector. Consequently, the study course "Principles of Finances" is updated according to current trends in the field and new developments in foreign study and scientific literature. The theoretical outline of the study course themes is based on practical examples and tasks that ensure the implementation of the study courses in compliance with the developed study program.

Participation of Associate Professor J.Malahova in the contracted work allows using the gained experience in the implementation of the study course "Civil Defence", but the competencies acquired by Assistant Professor at Professional Programs N.Balabka in contract work and projects related to regional development are invaluable in implementing the study course "Territorial Economic Activity". The knowledge and competences acquired by professor S.Treija and assistant professor D.Jaunzems in international scientific projects are used in study courses "Sustainable Living Environment" and "Sustainable Regional Energy Supply".

These examples demonstrate the scientific research potential of the academic staff and their professional qualification, which make a real contribution to the study process.

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

35 academic staff members are involved in the professional Bachelor study program "Engineering of Regional Development and Urban Economics". The complete list of academic staff in the study field with specified study program where they are involved is provided in Appendix in Chapter II. In the implementation of the study program both RTU elected academic staff, researches and guest lecturers are involved. Compared to the beginning of the reporting period in academic year 2017/18, the number of academic staff has not changed, however, qualitative changes have taken place.

As this is an inter-disciplinary study program, academic staff from other RTU faculties are also involved in the implementation of this program. There are 6 Professors, 8 Associate Professors, 10

Assistant Professors, 4 Assistant Professors at Professional Programs, 7 Lecturers and 1 Assistant. Currently, 69.7 % of elected academic staff have a Doctoral Degree, but in the beginning of the reporting period in academic year 2017/18 only 54.5% of academic staff had a Doctoral Degree.

In almost all academic staff groups the average age has decreased, except for Professors where the average age has slightly increased. The changes are provided in table below.

Changes in Academic Staff in Study Program

2017/2018			**2020/2021**		
	Number	Average age		Number	Average age
Professors	6	53.5	Professors	6	55.6
Associate Professors	**7**	46.5	Associate Professors	8	44.5
Assistant Professors	6	51.5	Assistant Professors	10	47.5
Assistant Professors at Professional Programs	6	43.1	Assistant Professors at Professional Programs	4	41.5
Lecturers	7	48.0	Lecturers	7	45.1
Researchers	2	65.0	Researchers	-	-
Assistants	2	33.0	Assistants	1	41.0
	36			**36**	

This is a positive trend, as it shows generational renewal of academic staff. Doctoral students are involved in the study process, which promotes the introduction of new teaching methods, as well as the linkage of the study process with their scientific research. In such a way, the administration of the study program takes care of the renewal of the contingent academic staff with a Doctoral Degree. In pursuing this aim, the European Social Fund Project No 8.2.2.0/18/A/017 “Development of the Academic Personnel of Riga Technical University” is being implemented.

Since 2019, with a focus on professional advancement, academic staff of the study program have the opportunity to participate at traineeship program within the European Social Fund Project No 8.2.2.0/18/A/017 “Development of the Academic Personnel of Riga Technical University”. Academic staff members can undergo a 200-hour long traineeship at different Latvian companies. This opportunity was used by 14 academic staff members involved in the implementation of the study program.

The above-mentioned generational renewal of the teaching staff, as well as the increase in the proportion of assoc. professors and assistant professors have an undeniable positive effect on the quality of the study process.

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

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

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

The interrelation between the study courses and their logical, sequential acquisition are essential for achieving the results of the study program. A system has been established to promote cooperation between academic staff and university in general, which provides regular academic conferences and professional advancement seminars for the development of teaching methodology competences. For example, academic conference “Integration of Teaching Methodological and Scientific Work into the Study Process” organized on April 27, 2018, academic conference “How to use information and technology to forge academic success?” organized on May 22, 2020 or methodical conference “What will we take from the pandemic study experience?” organized on April 23, 2021. Such events promote professional advancement of academic staff and provide opportunity to cooperate more efficiently in reaching learning outcomes and improving study courses.

The department responsible for the implementation of the study program reviews the study process and achieved results at the end of each semester. Student surveys on the quality of study courses play an important role in this process. Based on current situation analysis, solutions have been mutually found. For example, adjustments have been made to the structure of individual study courses to avoid partial overlapping and to improve the interrelation between study courses, or to include changes in the curricula of the study program have been proposed. In this case, the proposed changes are discussed and approved by the Committee of the Study Field “Architecture and Civil Engineering” and directed for consideration by the Faculty Council.

The student-academic staff ratio within the professional Bachelor study program “Engineering of Regional Development and Urban Economics” on April 30, 2021 is 2:1. Such proportion promotes good individual contact between students and academic staff, thus enabling them to perform their studies effectively. However, in fact, this ratio is higher because several study courses are implemented in flows with students from other programs, and academic staff do not work with only one specific study program.

Annexes

III - Description of the Study Programme - 3.1. Indicators Describing the Study Programme		
Sample of the diploma and its supplement to be issued for completing the study programme	diploma pielikums_supplement.pdf	diploma paraugs.pdf
For academic study programmes - Opinion of the Council of Higher Education in accordance with Section 55, Paragraph two of the Law on Higher Education Institutions (if applicable)		
Compliance of the joint study programme with the provisions of the Law on Higher Education Institutions (table) (if applicable)		
Statistics on the students in the reporting period	Annex 5. Students statistical data.xlsx	5.pielikums. Studējošo statistika RICH0.xlsx
III - Description of the Study Programme - 3.2. The Content of Studies and Implementation Thereof		
Compliance with the study programme with the State Education Standard	Annex 6. Compliance with the State Standard for Education.docx	6.pielikums. Atbilstība izglītības valsts standartam.docx
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard or the requirements for professional qualification (if applicable)	Annex 7. Compliance with the Professional Standard1 (1).xlsx	7.pielikums. Atbilstība profesijas standartam1 (1).xlsx
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 study courses.xlsx	8.pielikums. Studiju kursu kartējums.xlsx
The curriculum of the study programme (for each type and form of the implementation of the study programme)	Annex 9. Curriculum.xlsx	9.pielikums. Studiju plāns.xlsx
Descriptions of the study courses/ modules	Annex 10. Description of Study Courses_RICH0.zip	10.pielikums. Studiju kursu apraksti LV RICH0.zip
Description of the organisation of the internship of the students (if applicable)	ITA711_Description of internship.pdf	Prakses apraksts un nolikums.zip
III - Description of the Study Programme - 3.4. Teaching Staff		
Confirmation that the academic staff of the doctoral study programme includes not less than five doctors, of which at least three are experts approved by the Latvian Council of Science in the branch or sub-branch of science in which the study programme intends to award a scientific degree (if applicable)		
Confirmation that the academic staff of the academic study programme complies with the requirements specified in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions (if applicable)		

Transportation Engineering (47582)

Study field	*Architecture and Construction*
ProcedureStudyProgram.Name	*Transportation Engineering*
Education classification code	*47582*
Type of the study programme	*Professional master study programme*
Name of the study programme director	*Ainārs*
Surname of the study programme director	*Paeglītis*
E-mail of the study programme director	*ainars.paeglitis@rtu.lv*
Title of the study programme director	*profesors/ doktora*
Phone of the study programme director	
Goal of the study programme	*The aim of Professional Master Study Programme is to prepare students for scientific research activities and further doctoral studies, as well as for teaching job at university or practical work.*
Tasks of the study programme	*The tasks of the study program are to provide students with the acquisition of theoretical knowledge, skills, and abilities in the field of transportation engineering, as well as to promote the individual use of students' academic knowledge, cognition, and research skills to solve a specific problem.*
Results of the study programme	*Graduates of the Professional Master Study Programme:* *- to be able to show a specific basic and specialized knowledge in the Transport and Traffic science discipline, Surface Transport, and Infrastructure sub-discipline, and a critical understanding of this knowledge. A part of the knowledge conforms to the highest level of achievement in the field of Transport and Traffic Sciences.* *- can show the understanding of the most important concepts and relationships in the field of Surface Transport and Infrastructure sub-discipline.* *- to be able to carry out professional, innovative, or research work, formulate and describe analytically the information, problems, and solutions in the field of Surface Transport and Infrastructure sub-discipline, to interpret and have a substantiate discussion about them on the basis of the mastered theoretical knowledge and skills.* *- to be able to work on their own professional development, show the knowledge of different scientific approaches by solving technical or scientific problems, take the responsibility and initiative by working individually, in a team or other people management, make decisions and come up with creative solutions in variable or uncertain situations.* *- to be able to obtain, select and analyze information independently and use it to make decisions and deal with problems, show that they are aware of the professional ethics, can analyze the influence of their professional activities in the environment and society, and participate in the development of the professional branch.*

Final examination upon the completion of the study programme	*Having completed the study program, students have to elaborate Master Thesis (for variant 1- one-year studies) or Master Thesis and Transport infrastructure design project (for variant 2 -2.5-year studies).*

Study programme forms

Full time studies - 1 years - latvian

Study type and form	*Full time studies*
Duration in full years	*1*
Duration in month	*0*
Language	*latvian*
Amount (CP)	*40*
Admission requirements (in English)	*professional bachelor degree in transportation engineering*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Professional Master Degree in Transportation 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, 6 months - latvian

Study type and form	*Full time studies*
Duration in full years	*2*
Duration in month	*6*
Language	*latvian*
Amount (CP)	*100*
Admission requirements (in English)	*a bachelor degree in engineering in construction or comparable education*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Professional Master Degree in Transportation Engineering*
Qualification to be obtained (in english)	*Civil Engineer*

Places of implementation

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

3.1. Indicators Describing the Study Programme

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

The Professional Master Study Programme "Transportation Engineering", education classification code 47582; licence No. 04051-16 issued by the Ministry of Education and Science of the Republic of Latvia on 4 July 2006; accredited: 29 May 2017–30 June 2022; Accreditation Licence No. 2020/39.

Profile:	Civil Engineering
Level of studies	Professional Master Studies
Course code	RBGT0
Duration of the study course	1 year with a professional Bachelor degree in Transportation Engineering; 2.5 years with a professional Bachelor degree in "Civil Engineering" or a comparable degree.
Credit points	40 CP (60 ECTS) - 1 year studies and 100 CP (150 ECTS) - 2.5-year studies.
Previous education	Professional Bachelor degree in Transportation Engineering – 1-year studies and Bachelor degree in Civil Engineering or a comparable education – 2.5-year studies.
Degree awarded	professional master degree in transportation engineering or professional master degree in transportation engineering and Civil Engineer qualification for 2.5-year studies.

During the reporting period from 2017 to 2021, no changes were made to the programme parameters. Professional Master study programme "Transportation Engineering" envisages the study period of either 1 or 2.5 years. Upon completion of the one-year study programme and public presentation of the Master Thesis, the graduate receives the professional master degree in

transportation engineering. After graduation of 2.5-year studies, the graduate receives a professional master degree in transportation engineering and Civil Engineer qualification.

The content and curriculum of the professional Master study programme “Transportation Engineering”, as well as its main aim, is in line with the mission of RTU: to provide the Latvian economy and society with a competitive high-quality scientific research, higher education, technology transfer, and innovation.

The study programme is not currently being implemented in English, because the faculty has accredited the RTU and Vilnius Technical University's joint academic master's study programme “Innovative Road and Bridge Engineering”, which is implemented only in English and is attracted to foreign and Latvian students.

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

Professional Master study program “Transportation Engineering” has been developed considering the current trends in higher professional education in Europe; it has been designed to be recognizable in Europe, to make sure students acquire both theoretical knowledge and practical skills to be competitive in the European labour market.

The aim of the study programme is to provide education and training to the students so that they acquire professional tertiary education in transportation engineering corresponding to Level 7 of the Latvian Qualification Framework. In the course of professional Master studies, students develop the knowledge necessary to start independent work in the professional capacity or to continue studies at the Doctoral study programmes.

The quality of learning outcomes to be achieved in the course of studies is ensured by the coordinated system of program prerequisites, study aims and tasks. The general principles of the system are defined by RTU Regulations of Studies www.rtu.lv/content/view/5257/1874/lang,lv/.

The implementation of the programme complies with the Education Development Guidelines 2021-2027 “Future Skills for the Future Society” https://likumi.lv/ta/id/324332-par-izglitibas-attistibas-pamatnostadnem-2021-2027-gadam (in Latvian) and in the course of its implementation, the highest qualification specialists in the field of transportation engineering are educated and trained. The improvement of the Master study programme follows the requirements of the European Qualifications Framework, which complies with the Bologna process and other regulatory enactments.

Applicants with Professional Bachelor degree in Transportation Engineering for 1-year studies and Bachelor degree in Civil Engineering or comparable education for 2.5-year studies.

Enrolment procedure to the Master studies is regulated by “Regulation on enrolment to undergraduate academic and professional study programmes” approved by RTU Senate (https://www.rtu.lv/lv/studijas/uznemsana/uznemsanas-noteikumi/uznemsanas-noteikumi-pamatstu

dijas) (in Latvian).

Aims of the study program:

The aim of the professional Master study program is to educate and train students for scientific research activities and further Doctoral studies, as well as for the pedagogical jobs at a university or practical work.

Tasks:

- to provide students with theoretical knowledge, competencies and skills in the field of transportation engineering to promote the application of relevant knowledge and research skills to solve technical or scientific problems;

- to ensure development and improvement of the study program curriculum, study process, research activities accounting for the changes in international practice and research in the field of road transport infrastructure.

- to promote students' interest in further professional advancement, development of their academic knowledge and motivate them to continue studies at Doctoral programs.

- to develop students' research skills and facilitate their practical application.

- to promote research activities by academic personnel and students and support the practical implementation of the research results, to promote their international mobility and participation in the projects.

As a result of mastering the study programme, a graduate will be able (learning outcomes):

- to demonstrate in-depth or expanded knowledge and understanding of the latest discoveries in the field of construction and transportation engineering or transport construction which can provide a basis for creative thinking or research, including interactions between different fields;
- to independently use theory, methods and problem-solving skills, to conduct research work perform high-quality professional activities;
- to effectively use arguments in discussions of complex or systemic aspects of the field of construction and transportation engineering or the field of transport construction with both specialists and non-specialists;
- to independently develop their competencies and specialisation, take responsibility for the performance of personnel and provide a respective analysis of their work, conduct entrepreneurship and innovation in the field of construction and transportation engineering or in the professional area, perform duties, conduct research or pursue further studies in difficult and unpredictable conditions and, if necessary, develop their skills using new approaches;
- to independently formulate and critically analyse complex scientific and professional problems, justify decisions and, if necessary, perform additional analysis;
- to integrate knowledge from different fields, contribute to the creation of new knowledge and to the development of research or professional methods; to show an understanding and ethical responsibility for scientific results or the potential impact of professional activities on the environment and society;
- to show an understanding of the most important concepts and regularities of the transportation and traffic sectors.

The aims, tasks and learning outcomes of the professional Master study programme "Transportation Engineering" are interlinked and their reachability is very high.

Professional Master study programme “Transportation Engineering” envisages the study period of either 1 or 2.5 years. Upon completion of the one-year study programme and public presentation of the Master Thesis, the student acquires the Professional master’s degree in Transportation Engineering, whereas on completion of a 2.5-year study - a Professional Master Degree in Transportation Engineering and Qualification of Civil Engineer. The Standard of the profession of a civil engineer can be found https://registri.visc.gov.lv/profizglitiba/dokumenti/standarti/2017/PS-184.pdf, (in Latvian) (2021).

The programme is implemented within one and 2.5 years. The one-year programme provides for the hosting of professional bachelors' “Transportation Engineering” graduates. Since these students have already acquired specialised courses, the master's course is intended to prepare students for independent scientific research activities, to provide academic education to prepare further doctoral studies, the teaching of higher education or practical work in the construction industry. For two and a half years, the programme is intended for students who have completed the professional bachelor's programme Civil Engineering, but they need to acquire knowledge in the direction of transportation engineering. In addition to the one-year course of the study programme, this programme shall also teach the specialist courses of the professional bachelor, and the programme shall finally be awarded a master's degree in Transportation Engineering and the qualifications of the civil engineer. In this way, more possibilities can be provided for the carrying out of works in the various sectors of the construction industry.

The study programme is professional; thus, it always offers learning field trips and exchange of practical information at the enterprises and practical classes to improve skills and competencies of students according to the set learning outcomes of the study programme.

The study programme promotes the implementation of the leitmotif of Riga Technical University (RTU) as defined in its 2021-2025 Strategy: “*High quality and effectiveness – the 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 system built on research, innovation and cooperation with the industry. RTU educated and trains European and global-level engineers – leaders: developers of new technologies*.” (https://www.rtu.lv/writable/public_files/RTU_rtu_strategijas_2020._2025._gadam_21.12.2020_1_.pdf) (in Latvian).

The study programme fully complies with the development aim of RTU Faculty of Civil Engineering – to become an internationally recognized leading Latvian educational, research and development institution in the field of civil engineering, providing high-quality study process, internationally recognized research and sustainable innovation, commercialization and knowledge transfer for economic development.

Programme code 47582 complies with Cabinet of Ministers Regulation No 322 Latvian Classification of Education. The first and second levels of classification, represented by the first two digits of code 47, Second-level professional higher education (professional master's degree or level 5 professional qualification), awarded after obtaining a bachelor's degree, professional bachelor's degree or level 5 professional qualification. The third, fourth and fifth levels of classification (thematic groups, subject areas and programme groups), denoted by the next three digits 582, are Civil Engineering (58 stands for Architecture and Civil Engineering).

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

The aim of the EU transport policy is to ensure high mobility for people and enterprises in the European Union, including Latvia. This means accessible and high-quality transport and transportation infrastructure solutions, free movement of people, goods, and services, improvement of social and economic unity, as well as the assurance of the competitiveness of the European economy. Transport flows in Europe are dominated by road transport. It serves all Europeans (even those who do not travel, for the food and other goods, are delivered via road transport). Road transport accounts for 83% of passenger transport in the EU and 46% of all freight transport. Society's biggest and most long-term investments are aimed at the construction of transport infrastructure; therefore, high qualification specialists are necessary, who can design roads, bridges, other transport structures, manage construction projects, maintain these structures in working order, conduct scientific research, and develop new theories and methods of civil engineering.

Professional Master study program "Transportation Engineering" has been developed considering the current trends in higher professional education in Europe; it has been designed to be recognizable in Europe, to make sure students acquire both theoretical knowledge and practical skills to be competitive in the European labour market.

Education in the field of Civil Engineering at Riga Technical University (RTU) is implemented by the Faculty of Civil Engineering (FCE). It is implemented at the state accredited study programs at the four consecutive levels of academic education and professional qualification development. The first and second levels (college programme and professional Bachelor studies) provide the education necessary to perform professional activities in the field, the third and fourth levels (Master and Doctoral) – to perform research and pedagogical activities. Each education level provides education, which corresponds to the respective employment opportunities in accordance with the requirements of the State Professional Standard.

Professional Master study program "Transportation Engineering" consists of a set of lectures, practical classes and independent literature studies. Students obtain in-depth knowledge within technical and economic study courses relevant to the field of transportation engineering, as well as courses in humanities and social sciences.

In the process of its improvement, the changes in transportation engineering in Latvia and in the whole of Europe have been studied in recent years. The main emphasis has been placed on the introduction of new technologies to the study process, as well the training of the students to use construction information modelling which is included now in the study courses.

The study programme is being improved to make it appealing for young professionals. Research and analysis are carried out considering other universities across different European regions in order to improve the study programme as comprehensively as possible. The study courses within the study programme are based on general trends in the construction industry – they are included in the study courses, also the general professional understanding of the study courses needed to be mastered by the professionals in the field is also covered. The study programme is modern and follows the latest trends outside Latvia, as well as it is specific enough in Latvia to claim that it has its own well-defined place in the family of other study programmes in the field of engineering sciences.

The academic staff of the programme regularly follow and update the study courses so that they are based on the achievements and acknowledgements of the respective field of science. Course descriptions will be approved by the Programme Director and the Head of Department prior to the start of each semester to keep abreast of academic staff workload and possible development. The

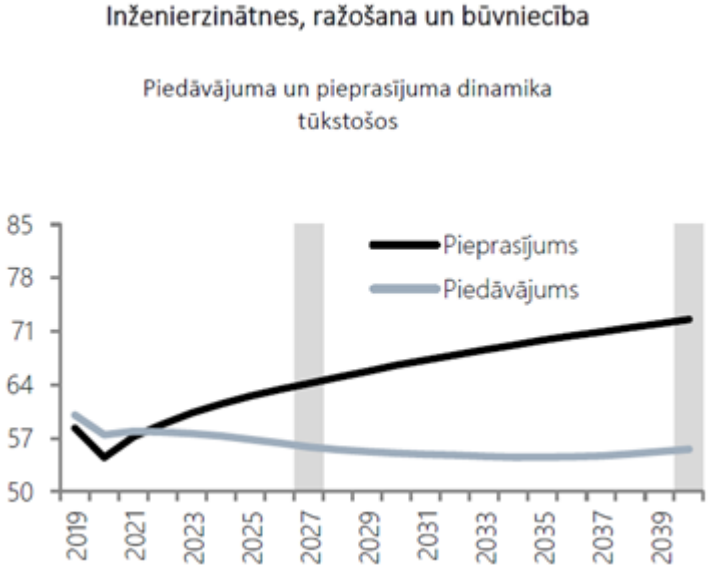
teaching staff also update the content of study courses in accordance with the trends of scientific development, using information available in the databases of scientific articles - EBSCO, Emerald, Scopus, Web of Science, etc. Academic personnel are motivated to publish the results of their research, especially in the scientific databases SCOPUS and Web of Science, with royalty for each article published in these databases. The results of the academic staff development are evaluated each year during the annual appraisal and the results are used to plan further professional advancement of each member of the academic staff.

The National Road Construction Programme for 2014-2023, approved by the Cabinet of Ministers, includes projects for capital investments of 1486.8 million EUR. This allows for a positive forecast of graduates' employment prospects.

On 1 January 2021, 73,073,749 km of roads and streets were registered in Latvia. The average density of the road network is 1,132 km per km2. The total length of national roads is 20,177,686 km. The average density of the national road network is 0.312 km per km2. Over the last five years, the share of road sections in poor condition in the national road network increased by 10% on average. The overall quality of roads continues to deteriorate. At present, 55% of the state roads have not been repaired in the required time. With the current insufficient level of financing for road maintenance and development, with the increase of traffic intensity and the share of heavy vehicles, there is constant road network deterioration and an irrational growth of expenditure for road users, as well as an increase in the number of traffic accidents. In 2019, 30.48% or 2,805.99 km of roads with black pavement were classified as deteriorated and required rebuilding of the pavement (in 2015 – 25%, in 2016 – 24%, in 2017 – 24.3%). In 2019, 42% or 4,681 km of state roads with gravel cover were classified as deteriorated. They need to be rebuilt.

The budget allocated for the improvement of roads and bridges in poor technical condition and for the design and construction of new transport structures allows looking positively at the future development of the industry and forecasting an increase in the demand for new transportation engineers over the next six years.

The Informative Report on Medium and Long-term Labour Market Forecasts for 2020 of the Ministry of Economics indicates that in 2030 the demand for labour will exceed the level of 2019 by 4.7% and will make up one-fifth of the total number of employees in the economy. This in turn will boost the employers' interest in recruiting new employees with knowledge in digital technologies, computer science, as well as people with analytical thinking skills. The demand for workforce will grow in only three sectors – commercial services, construction and manufacturing, see Figure 2.1.1.



Fig, 2.1.1. Supply and demand development dynamics (emzino_03062020-with-annexes1)

This means that our trained specialists with higher education will be in high demand in the labour market.

Furthermore, the study programme is improved after evaluation of the final examinations, as representatives of employers regularly take part in the work of Graduate Paper Examination Committees to assess the knowledge acquired by students within the study programme. Participating in the work of the Graduate Paper Examination Committees representatives from the industry can express their suggestions concerning the desired topics for student research in demand in the labour market. These recommendations are taken into account while improving the courses of the study programme for the next academic year.

When analysing the employment of graduates, it should be noted that they are mainly employed in private companies, municipal development departments and construction boards, design companies, public administrations and other sector-related organisations. These include SC ACB, SC Binders, SC Latvijas tilti etc. Many students find a job during their internship, and around 90% continue to work in their internship after graduation. When conducting a survey of students at the defence of a master's thesis, 98% of students have found jobs in speciality and are already working. A considerable lack of engineer personnel characterises the transport infrastructure engineering sector in Latvia.

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

The number of enrolled students during the reporting period is shown in Figure 1.2.1.

The fluctuations in the number of students are due to the following:

- The overall number of school graduates decrease.
- Uncertainty with the development rate and direction of the construction industry.

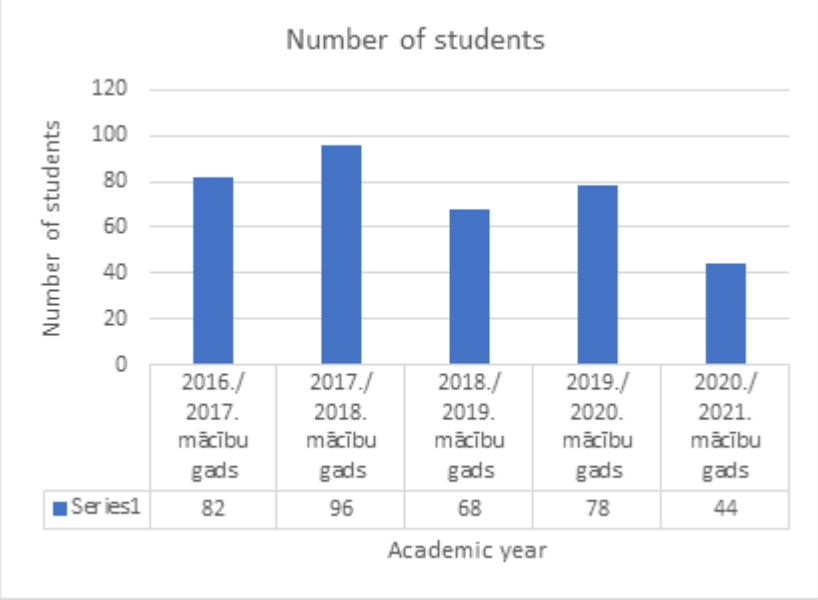


Fig. 1.2.1.a) The number of students studying in 1-year studies in the reporting period.

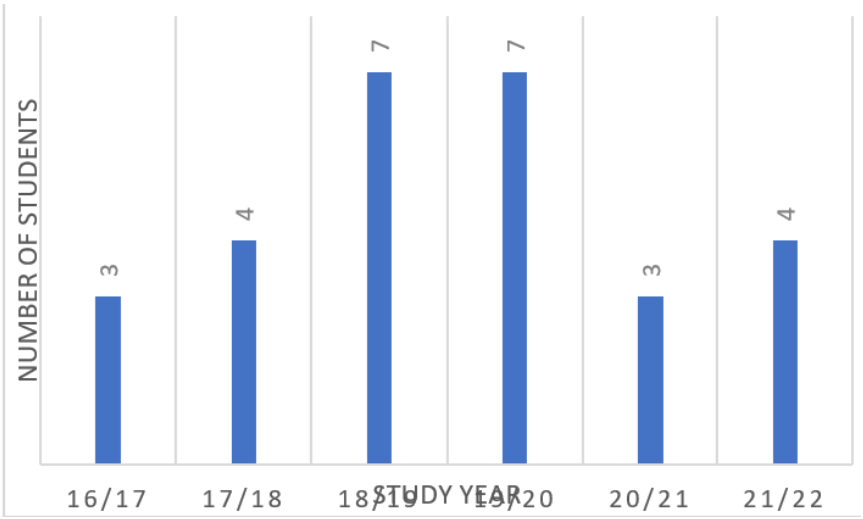


Fig. 1.2.1.b) The number of students studying in 2.5 years studies in the reporting period.

Distribution of graduates by the academic year during the reporting period is shown in Figure 1.2.2.

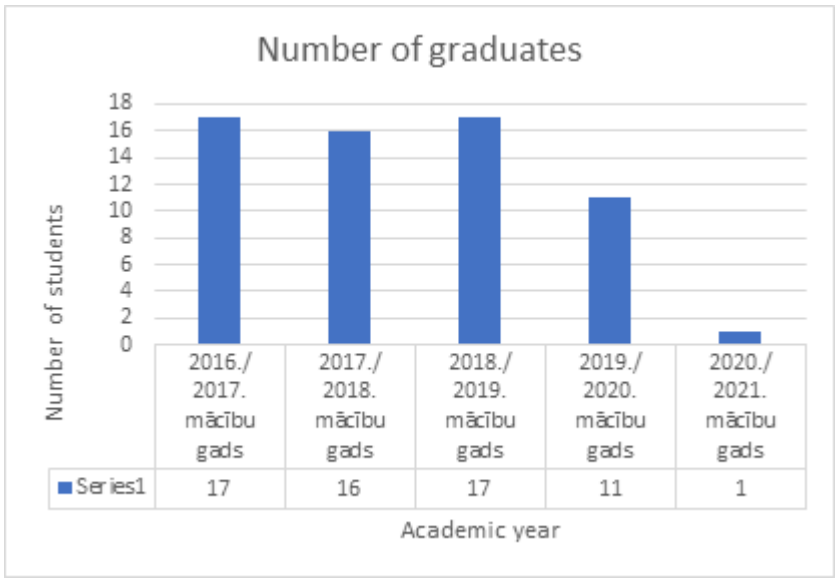


Fig. 1.2.2. Number of graduates in the reporting period.

During the reporting period, 62 Master Theses were publicly presented, and 62 students received a Professional Master Degree in Transportation Engineering.

Figure 1.2.3 shows the fluctuations in the number of students enrolled in the professional Master study program in the recent study years.

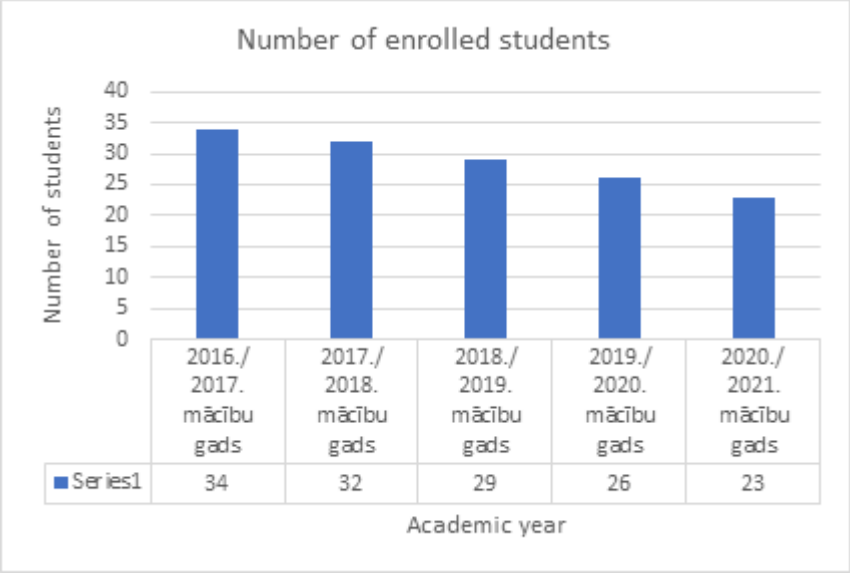


Fig.1.2.3. The number of enrolled students in the reporting period.

The costs of professional Master studies are covered by the state budget. Latvian is the main language of instruction at the professional Master study programme; however, when high-level professors are invited, (for example, prof. Gintaris Kaklauskas from VGTU, prof. Darius Bačinskas from VGTU) the lectures are conducted in English.

The data over the reporting period allow concluding that the drop-out rate among students at the Master study programme is not high. On average, it does not surpass 15% -25% of the overall number (see Figure 1.2.4).

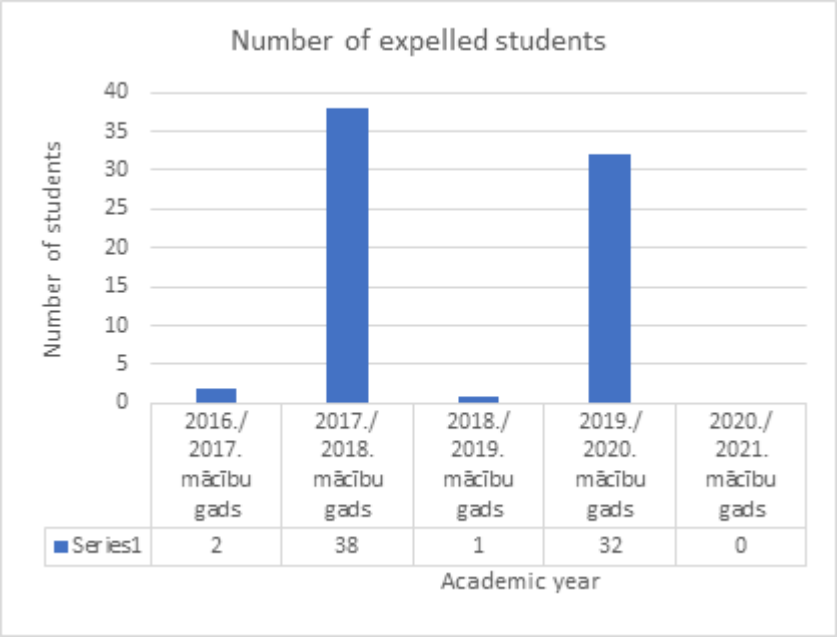


Fig. 1.2.4. The drop-out rate of students in the reporting period.

The main reasons for dropping out are the following: 1) inability to complete the study courses; 2) personal or family circumstances; 3) in a.y. 2016/2017, out of 2 expelled students 1 was expelled for academic failure and 1 did not renew studies after the sabbatical leave; in a.y. 2017/2018 out of 38 expelled students 22 were expelled for academic failure, 15 did not renew studies after the sabbatical leave, 1 at personal will; in a.y. 2018/2019 1 student was expelled at personal will; in a.y. 2019/2020 out of 32 expelled students 24 were expelled for academic failure and 8 did not renew studies after the sabbatical leave. Despite the aforementioned reasons, the sector of transportation

engineering is rapidly developing (billion-euro worth project Railbaltic has started), which in turn allows forecasting that the study programme can expect a steady student enrolment.

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

3.2. The Content of Studies and Implementation Thereof

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

The content of the professional Master study programme “Transportation Engineering” complies with the regulatory enactments of the Republic of Latvia, RTU internal regulations, Development Strategy of RTU and that of the Faculty of Civil Engineering, as well as contributes to the achievement of the United Nations Sustainable Development Goals (SDGs).

The Professional Master Study Program “Transportation Engineering” envisages the acquisition of general education courses, professional specialization courses, humanities and social science courses as well as second foreign language courses in the relevant speciality area. Within the framework of the free options, other study courses are also available. As the study program also incorporates an internship and a Master Thesis or Master Thesis including project, having completed the Program the graduate has fulfilled requirements of Transportation Engineer Occupational Standard and can be considered a fully-fledged professional with the profession Classification Code: PS-184 “Civil Engineer” with the 7th qualification level.

The Occupational Standard determines that a Transportation Engineer is a highly qualified specialist who can design roads, bridges and other transport structures, manage construction projects, maintain these structures in good condition; can perform structural calculations, demonstrate the knowledge of building materials technology and construction management; can organize and manage building site resources in a professional and cost-effective manner – can plan and supervise the construction and operation process: can check the project documentation, plan cooperation of all stakeholders involved in the object construction and supervise the execution of construction work, give the necessary orders to subordinates and construction project implementation participants and check the execution of orders, make sure that the construction work is carried out in accordance with the requirements of construction project, norms and

standards within a certain time limit and in compliance with the approved estimate; can plan the necessary measures for quality assurance as well as occupational and traffic safety on site; can draw up and control structure execution documents; monitor and analyse the performance of construction work and develop work organization and implementation projects at the technological level appropriate for building codes, efficiently and effectively use resources, demonstrate knowledge of the operation of construction structures, can conduct scientific research and develop new construction engineering theories and methods.

Within the study programme, themes of theoretical papers and practical tasks are regularly related to current trends in the industry. Research and creative work results are regularly reflected in scientific journals and conference materials. The Faculty of Civil Engineering regularly publishes the Baltic Journal of Road and Bridge Engineering https://bjrbe-journals.rtu.lv/, which is included in the SCOPUS and WEB of Science databases. Every year, the academic staff of the Faculty of Civil Engineering publishes dozens of articles in various local and international scientific journals and presents more than 20 papers at local and international scientific conferences. The variety in topics showcases a broad range of interests among staff members, which ensures informativeness and creative diversity in the study process.

The professional Master study programme “Transportation Engineering envisages the study period of 1 year for full-time studies a with total volume of 40 CP or 2.5-years for full-time studies with a total volume of 100 CP. The information included in the study courses comes from the aims of the study courses and the learning outcomes, which in turn follow from the aim of the programme and the learning outcomes. The link is clearly visible from the mapping of the study programme (see Annex 8).

The professional Master study programme “Transportation Engineering” consists of compulsory study courses that correspond to the profile of the qualification: the general study courses include “The Finite Element Method”, “Modern Materials for Developing Construction”. Compulsory elective courses include “Highway Design”, “Bridges”, “Traffic Organisation and Safety”, “Introduction to Traffic Flow Theory”, “Aesthetics of Civil Structures”, “Highway Improvement”, “Highway Construction Materials”, “Construction Materials for Special Buildings, as well as “Pedagogy” and “Psychology”. Upon successful completion of the courses, students develop a Master Thesis or a Master Thesis with an engineering project (in case the master student is willing to obtain the Qualification of Engineer in Transportation Engineering). The structure of the programme is given in Table 2.2.1.

Part	Content	Credit points	Volume %
Part A	Compulsory study courses	8 CP	20%
Part B	Compulsory elective courses:	6 CP	15%
	- Professional specialisation courses	4 CP	10%
	- Pedagogy and Psychology study courses	2 CP	5%

Part D	Internship	6 CP	15%
Part E	Final examination (Master Thesis)	20 CP	50%
	TOTAL	40 CP	100%

As part of the compulsory study courses, there are two theoretically and practically significant specialisation courses. Compulsory elective courses envisage specialisation courses with a total volume of 40 CP as well as pedagogy/psychology courses with a total volume of 2 CP. The volume of the internship is only 6 CP, and the main value is placed on the development of the Master Thesis and viva voce examination. This allows realistically assuming that the graduates are able to solve current tasks in the field of transportation engineering and that their knowledge complies with the "graduate" study level set by the Bologna Declaration.

According to the standards of the Cabinet of Ministers for the second level, higher professional education, to ensure the acquisition of the latest achievements in the theory and practice the study courses must amount to at least 7 CP. This group includes compulsory study courses that amount to a total of 8 CP which indicate that the standard requirements are met. Research work, design project, and management courses must amount to at least 5 CP. In the given programme, these requirements are implemented in a group of compulsory elective courses, the amount of which is 6 CP, indicating that the standard requirements are met. The volume of pedagogy and psychology courses – 2 CP – meets the standard requirements. Volumes of internship and Master Thesis – 6 CP and 20 CP, respectively, comply with the requirements of Cabinet Regulation No. 481. Consequently, the professional Master study programme "Transportation Engineering" complies with the state standards for the second level professional higher education.

For applicants with a Professional Bachelor Degree in Civil Engineering, the duration of studies is 2.5 years in order to obtain the Qualification of Engineer in Transportation Engineering and a Professional Master Degree. The volume of courses to be acquired within the study programme is 100 CP. The structure of the programme is provided in Table 2.2.2.

Table 2.2.2. Structure of the Programme for 2.5-year Master Studies after Obtaining a Professional Bachelor Degree in Civil Engineering or Recognised Education

Part	Content	Credit points	Volume %
Part A	Compulsory study courses	21 CP	21%
Part B	Compulsory elective courses:	21 CP	21%
	- Professional specialisation courses	19 CP	19%

	- Pedagogy and Psychology study courses	2 CP	2%
Part D	Internship	32 CP	32%
Part D	Final/state examination (Master Thesis with an engineering project)	26 CP	26%
	TOTAL:	100 CP	100%
Part E	Final/state examination (Master Thesis)	20 CP	50%
	TOTAL:	40 CP	100%

As the programme envisages internship, which amounts to 26 CP, and the development of the Master Thesis with an engineering project, it can be considered that the graduate meets the requirements of the occupational standard of Engineer in Transportation Engineering approved by the Ministry of Education and Science, and such a graduate is ready for the profession with the following code in the classification of profession PS-184 “Civil Engineer”.

Each study course has a defined aim and learning outcomes to be achieved. All knowledge, skills and competences in the study course are related and subordinated to the aims and expected learning outcomes of the study programme. The plan of the study programme is given in Annex 9, the descriptions of the study courses – in Annex 10. Each study course provides acquisition of 1 through 5 programme outcomes. Each programme outcome corresponds to at least 1 study course, but on average there are 5 or more courses.

Prior to the start of an academic term, each member of the academic staff has to examine the course description, assess the existing aims of the course and the expected learning outcomes, and has to examine the learning materials and literature, make sure that the literature is up-to-date and includes the advanced research in the field.

To provide the cross-complementarity of the study courses, as well as to avoid duplication, the academic staff discusses regularly the structure of the study programme. The descriptions of the study courses are available on ORTUS platform, so the academic staff has access to descriptions of other study courses which ensures their interconnection.

The reconstruction of the building of the Faculty of Civil Engineering Period has been done from 2019 until 2021, which resulted in a modern building and new laboratory premises.

3.2.2. In the case of master’s and doctoral study programmes, specify and provide the justification as to whether the degrees are awarded in view of the developments and findings in the field of science or artistic creation. In the case of a doctoral study programme, provide a description of the main research roadmaps and the impact of the

study programme on research and other education levels (if applicable).

The content of the professional Master study programme “Transportation Engineering” is based on the content and achievements of scientific discipline of Civil engineering and transport engineering, sub-discipline the surface transport infrastructure.

The professional Master study programme “Transportation Engineering” defines the following scientific research directions:

Field of research	(%)
Research of road construction materials	20
Research of asphalt concrete for road pavement	30
Estimation of the the lifetime of bridge structures	10
Methods for evaluation and modelling of the bridge damages	10
Studies of geo-technical conditions of construction	10
Road safety studies	10

The themes of theoretical works and practical tasks of the study programme are regularly related to advances in the industry. Research and creative work results are regularly published in scientific journals and conference proceedings. FCE regularly publishes the journal “The Baltic Journal of Road and Bridge Engineering” https://bjrbe-journals.rtu.lv/ , which is included in SCOPUS and WEB of Science databases. Annually, academic staff of FCE publish several dozens of articles in various national and international scientific periodicals and take part at local and international scientific conferences with more than 20 reports. Thematic diversity illustrates a broad spectrum of individual interests that offer diversity of information and creative work in the academic work.

Students in the professional Master study programme “Transportation Engineering” have an opportunity to specialise in one of these research fields:

- Construction materials of road pavement.
- Sustainable bridge management systems.
- Smart, multipurpose composite materials and structures.
- Road and bridge design.
- Geo-technical studies of road and bridge foundations.
- Road safety studies

For example, the members of the academic staff work in the following fields of research:

Road, bridge and road traffic research – Professor, Dr.sc.ing. Juris Smirnovs, Professor, Dr.sc.ing. Ainārs Paeglītis, Professor, Dr.sc.ing. Atis Zariņš, Assistant Professor Dr.sc.ing. Viktors Haritonovs. Detailed description of the research fields:

- Road traffic safety, including research on traffic safety in cities, optimal traffic organization schemes, methods to eliminate “dark spots” (Prof. J. Smirnovs);

- Road asphalt concrete coating research, including research on durability of bitumen coating, development of new asphalt-concrete compositions using new innovative materials (lead.res. V. Haritonovs);

- Optimization of spatial road design parameters (prof. A. Zariņš).

Many publications during the reporting period could be considered one of the most significant high-quality scientific research indicators of the professional Master study programme “Transportation Engineering”. For example, in 2015-2021, a total of 183 articles by the academic staff working at the professional Master study programme “Transportation Engineering” have been published in the journals indexed in SCOPUS database, of which 57.9% are published in Open Access journals. The themes of publications by areas are given in the figure below.

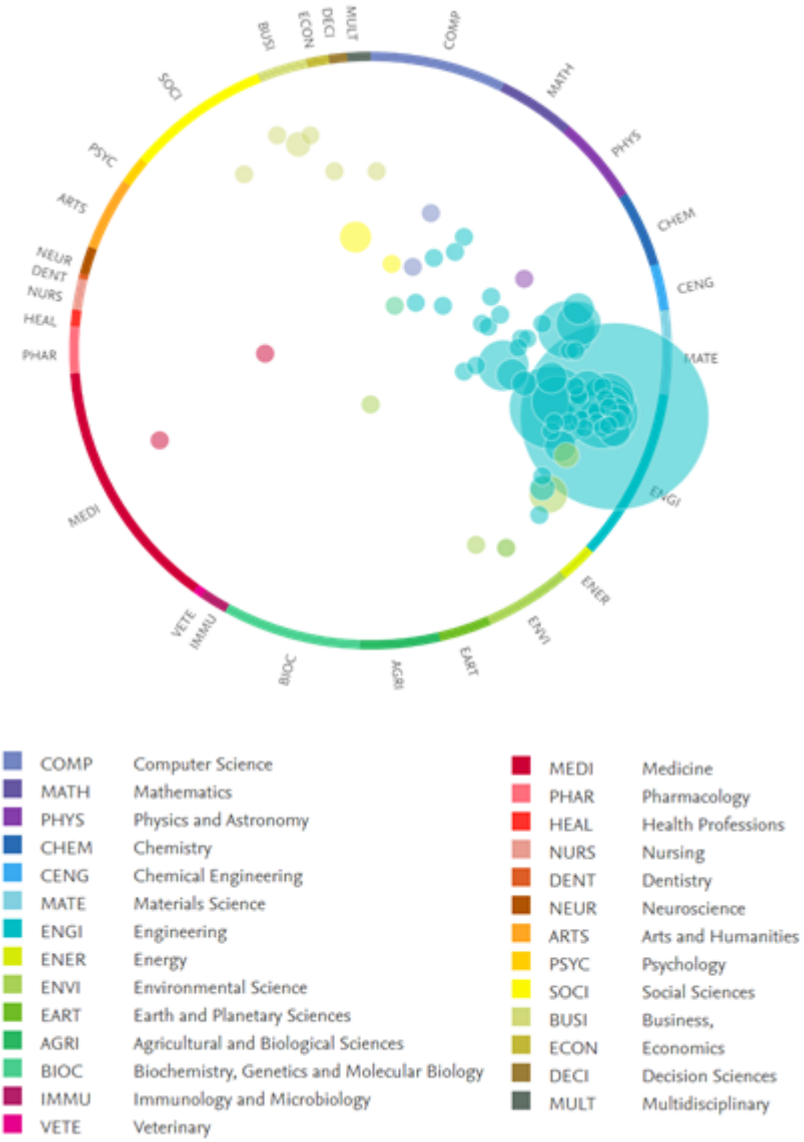


Figure 2.2.1. Input of SCOPUS indexed publications by the academic staff working at the professional Master study programme “Transportation Engineering” (in 2015-2021; the data for 2021 are incomplete) to the development of thematic areas (SciVal data).

It can be concluded that the allocation of master's degrees is based on the achievements and lessons of the undertaking of the scientific discipline of Civil engineering and transport engineering, sub-discipline the surface transport infrastructure.

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

Professional Master Study Programme “Transportation Engineering” has been developed so as to ensure successive development of knowledge, competences and skills on the basis of individual and group work, as well as continuous communication between the student and the instructor.

The study courses are evaluated in accordance with the RTU Senate Decision of 29 March 2010 "On the Regulations for Evaluation of Learning Outcomes", the RTU Senate Decision of 25 May 2001 "On the Criteria for Evaluation of Learning Outcomes " and the RTU Senate Decision of 29 January 2001 "On the Transition to a Unified Evaluation of Study Results" in a 10-point system (10 - excellent, 1 - very, very poor). The examinations consist of tests, study papers and exams according to the study plans approved for each semester.

Learning outcomes for each study course are defined separately, they are included in the Study Course Description that is published in the RTU Study Course Catalogue. Each instructor within their study course tests the knowledge, skills and competences of the students specified in the course description (papers, tests, presentations, independent works, case study analyses, group works, etc.). The final grade is the sum of all test papers and examination grades, the percentages of which are also indicated in each course description and presented to students at the beginning of the semester.

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 in ORTUS portal 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 program and learning outcomes are taken into consideration.

Student-cantered teaching and learning principles are observed within the Professional Master Study Programme “Transportation Engineering”. The approaches used during studies promote achievement of the aims and learning outcomes of the study courses and programme. Students have an opportunity to influence their study process, remain autonomous, submit feedback on the study process, aligning it with their expectations. It must be noted that learning and training guidelines are defined in the RTU Code of Academic Integrity, Regulation on the Assessment of Learning Outcomes, the methodological guidelines for development of the study papers and the

thesis, etc.

Examinations set by the program allow making sound conclusions about the level of knowledge and skills of each student assessing their progress in the long term. In order to improve student academic performance and raise their interest in acquiring comprehensive knowledge, FIC runs an annual competition among the students for the opportunity to continue studies on the state budget funds. The only criterion that is taken into consideration is student's academic performance in the previous period.

Implementation of the study programme is carried out using different modes of the study course implementation. Students work in small groups, but at senior courses - through individual work, which allows applying appropriate and diversified pedagogical approaches. The study process is organized in the way to encourage the autonomy of students, simultaneously providing support to the member of the academic staff in their capacity of scientific supervisor a mentor.

RTU has an established quality assurance system. The quality of a study programme is assessed by study programme administration, departments that implement it and other involved units, Field Study Programme Committee of the faculty, Faculty Council and RTU Senate, as well as student self-government of the faculty.

Successful performance of the internal education quality assurance system at RTU is ensured at the following levels:

At the **level of the Office of Vice-Rector for Academic Affairs**, internal education quality assurance is performed by the Study Department, which:

- provides operations and control of RTU Study Course (SC) Register, monitoring whether the study course correspond to the requirements of the respective tertiary education program and its content;
- surveys students at the university level to discover how successfully first year students have adapted to the university system, to find out the level of student satisfaction with the study process, lectures, practical classes and academic staff, as well as ensures that survey results are available to RTU Study Department, each member of academic staff, heads of departments, Deputy Dean for Studies and a responsible person at the Office of Vice-Rector for Academic Affairs;
- ensures relevant premises and technical support to general lectures (100 – 200 seats).

At the **level of RTU faculties**:

- once a year, the head of the study programme submits a report to the Council of the faculty, prior to that assessing and ensuring the relevance of the study program at the Faculty Study Field Commission;
- student self-government is involved in the overall quality assurance process of the study program. Representatives of the student self-government actively participate in work of decision-making bodies: RTU Academic Assembly, RTU Senate, RTU Senate Commissions and Faculty Council.

At the **department level**:

- each semester the administration of the study programme analyses the results of the student survey on the quality of academic staff performance and overall assessment of the study program. The results are discussed at the department meetings, meetings of the Faculty

Study Field Commission and Faculty Council meetings;

- once per academic year annotations to the study course within the study program, course syllabi, methodological resources, the list of literature and the guidelines for development of the course works (reports, papers, internship reports and graduate papers) are reviewed;
- courses and seminars for faculty members are regularly organized to address such issues as the newest teaching and pedagogical methods. Members of academic personnel are motivated to attend qualification advancement courses;
- academic personnel and administration of the study program participate in various experience exchange activities, cooperating with universities from other countries, meeting representatives of the industry and entrepreneurs, discussing topical industry issues and student research work and projects;
- departments continuously monitor that the quality of the premises and equipment meets quality requirements and update the resources as necessary.

Additional quality assurance system accounting for the specifics of the study field is implemented **within the study programme**:

- regular monitoring of student individual performance (responsible authority – academic staff);
- regular reporting of performance results in the RTU Study Management System (responsible authority – faculty record management department);
- regular monitoring of the study program implementation process (responsible authority – program administration);
- regular discussion with the student self-government and program administration on the detected drawbacks and risks related to the study process (responsible authority – student self-government);
- regular updating individual courses and themes accounting for the newest discoveries and trends in the research field (responsible authority – Faculty Study Program Council);
- arbitration mechanism (responsible authority – program administration).

Learning outcomes for each study course are defined separately and are included in the study course description, which are published in RTU Study Course Catalogue.

Examination and credit test questions are prepared by the instructor responsible for the study course based on the approved description of the study course and the study program. Examination questions are formulated to ensure that a student is capable to comprehensively answer them thus demonstrating that they have fully covered course content. Tests are carried out in accordance with the requirements stipulated in effective RTU regulations.

Assessment of student advancement and their performance is conducted through the entire period of program implementation. At the seminar's students submit their works to the instructor and develop their presentation skills and competences. Tests envisioned by the program allow making sound conclusions about the level of knowledge and skills of each student assessing their progress in the long term. Presentations of course papers are public and are aimed at developing students' discussion skills.

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

students during the internship included in the study programme with the learning outcomes of the study programme (if applicable).

The Professional Master Study Programme “Transportation Engineering” includes Internship in the volume of 6 CP (1-year studies) or 32 CP (2.5-year studies).

Internship is an integral part of a professional study programme, which is to be done according to LR regulations, the resolution of RTU Senate of 29 April, 2002 “On the structure of the second-level professional study programmes” and the resolution of RTU Senate of 28 January, 2019 “On organization of internship at Riga Technical University, new edition”.

The aim of the internship is to participate in the work of an organisation, get acquainted with company’s technical and technological equipment, compile technical specifications and informative material, complete practical tasks, which could require the use of the previously acquired knowledge.

A place for internship can be any company or organization, which allows acquiring the basics of civil engineer job related to construction project design, management, technology of construction materials, management of civil works, planning and supervision of civil works, project documentation, procedure of on-site works, experience in working with construction regulations and standards, planning of necessary activities for on-site quality control and labour safety, preparation and control of as-built documentation, supervision and analysis of the works, effective and appropriate use of resources, competence in issues of building operations, use of design software.

If students need it, RTU offers assistance of a student career specialist, who can find a suitable place of internship, but a student also can choose the place of internship individually, which is also the most popular way of finding a place for internship. After that a tripartite cooperation agreement is concluded and the student can proceed to complete the internship tasks within 20 weeks. The agreement mentions contact persons – an internship supervisor at the company and an internship supervisor at the University. The internship supervisor at the University is the Head of the study programme or another person according to the study plan. The internship supervisor at the University provides support during the internship period. After the internship period, the student submits the internship report. Before the submission of the internship report, the internship supervisor reviews the report, gives feedback, and comments regarding the improvement of the report, which enable the student to better prepare for the public presentation. After that, in the presence of the internship supervisor, the student publicly presents the internship results to the group of fellow students. Internship is evaluated according to a 10-point grading scale.

Professional internship influences the overall learning outcomes, for it is one of the final stages before the elaboration of the Master Paper and the engineering project; therefore, during the internship the student must demonstrate the knowledge defined in the study programme, apply the skills and acquired competences. The internship shows student performance to a greater extent than individual study courses.

The internship tasks included in the study programme are individual and are closely related to the analysis and assessment of the learning outcomes of the study programme. Within the study programme, internship mentors and supervisors support the students in the achievement of the set tasks by means of regular communication and internship supervision.

3.2.5. Evaluation and description of the promotion opportunities and the promotion

process provided to the students of the doctoral study programme (if applicable).

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

Professional Master Study Programme "Transportation Engineering" includes a final examination – a Master Thesis in the volume of 20 CP (1-year studies) or a Master Thesis including an engineering project in the volume of 26 CP (2.5-year studies).

The Master Thesis intends conducting scientific research in the field of transportation engineering, as well as an engineering project (only for students with a Bachelor Degree in Civil Engineering), in which a specific research issue is developed.

The Master student should demonstrate professional and research skills in accordance with the state regulations on the professional Master degree.

The final examination procedure implies development of a Master Thesis. The topic of the Master Thesis shall be approved by a scientific adviser and the head of the department. Students choose the fields of their Master Thesis from the sample topics suggested by each department; or, more often, they solve problems relevant to the industry or company according to the latest internship. The academic staff member of the department or an engineer in transportation engineering holding or Master or Doctoral degree can be a scientific adviser of the Master Thesis.

A student and their scientific adviser also agree upon the calendar plan, but each department has its own control terms, taking into account that both autumn and the spring academic terms consist of 16 academic weeks. The theme of the Master Thesis is chosen during the 1st semester, and by the end of the semester a literature review of the theme under consideration must be compiled. In the last, 2nd semester, student work is regularly controlled: in 5 weeks, 50% of the total work must be completed; in 12 weeks – 75%; and after 16 weeks – the Master Thesis must be submitted to the State Examination Committee for public presentation. Student must receive scientific adviser's approval for the viva voce examination. In case the student has not completed all the requirements imposed by the scientific adviser, or in case of excessive plagiarism (> 30%), the viva voce examination is not allowed.

Before the Viva Voce, the paper is reviewed by reviewers approved by the order of the Head of the Institute of Transportation Engineering. The Viva Voce Examination is public, it is evaluated by the State Final Examination Committee approved by RTU Rector, which includes both academic personnel and representatives of professional transportation engineering associations and companies. Examples of the themes of recent Master Theses:

- Analysis of the Effect of Shrinkage and Creep on Cable-Stayed Bridges with Reinforced Concrete Spans.
- Analysis of the Load-Bearing Capacity of a Cable-Stayed Bridge in the Event of a Single Cable-Stayed Break.
- Analysis of the Significance of Parking Lots in the National Road Network and Research of Further Development.

- Evaluation of the Efficiency of Bridge Span Structures Reinforced with Reinforced Plastics.
- Analysis of Factors Influencing the Load-Bearing Capacity of Reinforced Concrete Bridges.
- Use of Cement and Wood Ash to Stabilize the Base Course of the Paved Asphalt Concrete.
- Research of the Use of By-Products for the Development of Asphalt Concrete Compositions.
- Capacity Analysis of Single-Level Road Junction Types.
- Analysis of the Application of Roundabouts in Urban Conditions.
- Use of Recycled Asphalt in the Production of Hot-Mix Asphalt Concrete.
- Assessment of the Level of Road Safety of Urban Development Plans.
- Turbo Roundabout Safety Analysis.
- Traffic Safety Analysis in Stages with a High Number of Animal-Induced Road Accidents.
- Investigation of the Influence of Nano Aggregates on the Performance Properties of Asphalt Concrete.

Analysing the wide range of topics, it can be concluded that both teaching staff and students demonstrate their skills, knowledge and competences at a very high level and in line with the topicality of the field. The choice of topics is based on the student's interest in current developments in the field and on the student's preferences for future career choices, and the final thesis topics owe to the sustainability and development of the programme as a whole.

In the reporting period, final grades for the graduate papers were in the range from grades 6 to 10. The final grade is made of the grade ascribed by the reviewer, which contributes 50% to the grade, and the evaluation of the Viva Voce Examination Committee, which contributes the other 50%.

3.3. Resources and Provision of the Study Programme

3.3.1. Assessment of the compliance of the resources and provision (study provision, scientific support (if applicable), informative provision (including libraries), material and technical provision, and financial provision) with the conditions for the implementation of the study programme and the learning outcomes to be achieved by providing the respective examples.

RTU Faculty of Civil Engineering (FCE) continuously monitors compliance to quality requirements of rooms and technical equipment, the appropriate lecture halls with necessary multimedia hardware have been equipped. In order to ensure the qualitative study process, FCE is carrying out extensive refurbishment works, upon their completion the Faculty will meet international standards for campuses and lecture halls. Classification of the premises is given in the table below.

Room type	Number of rooms	Useful area m²
Meeting room	1	70.91
Computer rooms	4	243.77

Auditoriums	23	1702.34
Teachers' rooms, cabinets	69	1523.61
Assistant professor / Doctoral student premises	5	196.24
Workspace / workshop	6	172.19
Research facilities	6	350.53
Laboratories	35	1256.83
Resource room	6	213.53
Auxiliary room	11	197.99
Anteroom	3	35.89
Student self-government and record keeping	3	260.43
Kitchen	1	16.43
Total		**6240.69**

FCE institutes provide education and learning support: develop and update descriptions of the study courses, implement the corresponding study courses (including practical and laboratory works and seminars), supervision and defence of the graduate papers, and other activities related to learning, teaching and research work.

In 2017 – 2020, substantial investments were made in the research infrastructure. For example, the Institute of Transport Engineering had acquired such equipment as a Hamburg testing device (automatic Hamburg two-wheel tracker), as well as a roller-compactor, a four-point fatigue testing machine (four-point beam bending machine), a drone with infrared camera for open-air drone-based measurements and reading, as well as a high-resolution camera for additional imaging. In 2021, the Institute of Materials and Structures in cooperation with the largest manufacturer of construction materials in Latvia – “Sakret” Ltd., established a new laboratory – 3D concrete printing laboratory equipped with a 3m x 3m concrete 3D printer. In 2020, FCE founded the Centre for Digital Building Technologies that carries out active research and training in Building Information Modelling (BIM).

The Scientific Library of RTU (https://www.rtu.lv/en/studies/scientific-library) is an academic library of state significance, which has obtained its status as a result of library accreditation. The Scientific Library of RTU provides the necessary information for RTU study process and research activities, performs library, bibliographic and information services for RTU students, teaching staff, and employees. The Library's collection includes 1.4 million printed documents and e-resources in the databases relevant to RTU fields.

In 2016, significant investment was made in the development of the library infrastructure, with the

construction of an additional 2240 m2 of space for the Central Library. The total area of the library premises is 6393 m2, of which 3417 m2 are for reader services. There are 713 workstations for library users. The library has four group rooms and six individual cubicles, a Western reading room and a conference room. The library is accessible to users with reduced mobility.

To improve the work of the Scientific Library of RTU and to ensure the availability of information needed for study and research work, the Library Council has been established, which decides on the replenishment of the library's collection with printed publications and subscriptions to the necessary databases. The Library Council has approved the "RTU SL Collection Completion Policy", which defines the basic principles of collection formation and development in accordance with the directions of RTU study and scientific activities.

When RTU provides funding for the library, the funding for information resources for each study programme is calculated. The collection is replenished according to the recommendations of the heads of study programme, researchers, and the allocated funding. The desired titles can be ordered by contacting the Library's Collection Development Department, ordering on the Library's website, filling in the order form, filling in the application form, by phone or by visiting the Library. The Scientific Library offers a guide to ordering titles and e-resources, which brings together the websites of various publishers and bookshops in Latvia and abroad.

Database subscription contracts are concluded both directly with the supplier and through the "Cultural Information Systems Centre" state agency, which is the Latvian national representative of the international non-profit organisation EIFL (Electronic Information for Libraries, http://www.eifl.net/). The EIFL Licensing Programme offers national libraries subscriptions to internationally recognised databases at significantly reduced subscription fees not offered to individual subscribers, thus saving financial resources of the libraries.

The database subscriptions maintained by RTU Scientific Library

(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.

- Databases financed by the Ministry of Education and Science available to RTU Scientific Library: ScienceDirect, SCOPUS (Elsevier), Web of Science.

- Latvian databases: LETA, Letonika, the Database of Latvian Standards (available on the premises of the Library).

Database usage at the Scientific Library of RTU has been growing since 2016. E-resource loans have increased from 75,391 to 525,194 items.

The new library premises have allowed to extend the range of services. Since the opening of the new premises in 2018, the number of visits to the library has increased from 103,825 to 235,600. The Scientific Library of RTU is open to everyone. The Central Library is open to users from Monday to Saturday. There is a 24/7 reading room. During the summer period, the Central Library is open every weekday with reduced opening hours. (https://www.rtu.lv/lv/studijas/biblioteka/pakalpojumi-3) (in Latvian).

The library's sources are housed in an open-access collection. Books and periodicals according to the field of study and the UDC indexes are located in the central building of the Scientific Library, 5 Paula Valdena Street, Riga. The last copies of the oldest publications corresponding to the RTU

profile are kept in the library repository. They are always available to the users.

The librarian on duty helps visitors find their way around the collection. Bibliographers (information specialists) provide more detailed information and advice. The library has a branch librarian service (https://www.rtu.lv/lv/studijas/biblioteka/nozaru-informacija) (in Latvian).

The library resource search is supported by the Primo Discovery search tool (https://www.rtu.lv/lv/studijas/biblioteka/vienota-informacijas-meklesana). It allows searching the library catalogue (https://kopkatalogs.lv/F/?func=find-b-0&local_base=rtu01) (in Latvian), the subscribed databases, as well as databases created by the RTU Scientific Library (https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/bibliotekas-veidotas-datubazes) in one interface. Searching for information in the electronic joint catalogue (https://kopkatalogs.lv/F), it is possible to simultaneously obtain information on the resources available in 12 Latvian libraries. Both the electronic catalogue and the RTU portal ORTUS allow remote reservation of library resources, as well as remote access to the databases. Since the introduction of RFID technology, users can use five self-service book-dispensing machines and check out books from the pick-up machines around the clock.

The library provides students, academic personnel and other stakeholders with various levels of individual consultations and group training in information literacy (https://www.rtu.lv/lv/studijas/biblioteka/lietotaju-apmacibas) (in Latvian).

Publications not available in the library are delivered via an interlibrary loan or an international loan.

Internet access is available throughout the library. The library has copying, scanning, printing, binding services and a self-service dining room.

Students, whose permanent residence is outside Riga or Pieriga, are offered accommodation at RTU hotels. These services are also available for incoming students and guest professors. In addition, RTU has also cooperation agreements with other accommodation providers to offer guests the desired level of comfort, if necessary.

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

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

Both state budget financing and student funds will be used for the implementation of the study

programme. Information on the expected financial resources of the programme is presented in Table 3.1.1.

Table 3.1.1. Study Programme Funding

Academic year	State budget funding for the programme, EUR	Tuition fees, EUR	Total study programme funding, EUR	Cost per student, EUR
2016./2017.	142212,56	2780,7	144993,26	5799,03
2017./2018.	110318,04	0	110318,04	6060,99
2018./2019.	114940,99	0	114940,99	6344,5185
2019./2020.	115748,98	0	115748,98	6607,563

The analysis of the information shows that the state budget grants for the study programme have increased during the reporting period. The cost per student has increased, which is justified by the overall increase in total RTU costs (utilities, building maintenance, etc.).

Information on the minimum number of students in RTU study programmes is provided in the appendix of the self-evaluation report "On a minimal number of students in study programmes".

Information on the funding distribution between the cost items is provided in the appendix of the self-assessment report "Funding distribution between the cost items".

3.4. Teaching Staff

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

The Faculty of Civil Engineering of RTU employs highly qualified academic staff. It can be characterised by the high number of publications during the reporting period. For example, in the period from 2013 to 2020, 757 articles were published in journals indexed in the Web of Science and SCOPUS databases.

The dynamics of changes in the number of publications by year is shown in Figure 4.2.1.

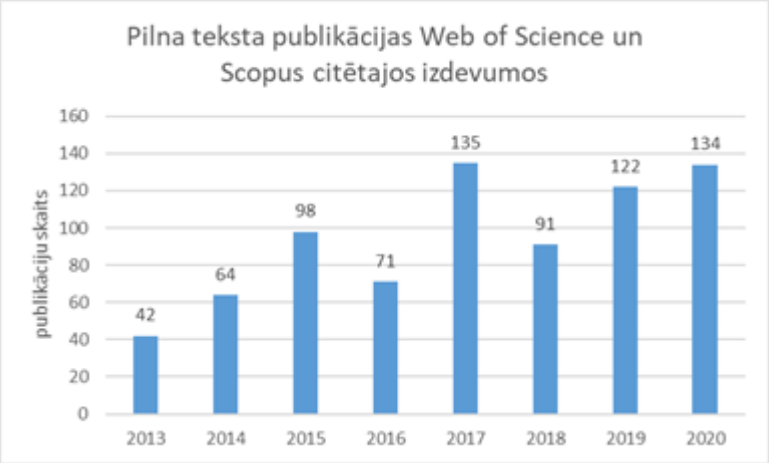


Fig. 4.2.1. Number of full-text publications in the journals indexed in SCOPUS and Clarivate Analytics.

The following qualitative and quantitative indicators show that the qualifications of the academic staff meet the requirements specified in Article 55 of the Law on Higher Education Institutions - 6 professors and associate professors, who have been elected to academic positions in RTU departments and are experts in their field approved by the Latvian Council of Science, participate in the implementation of the compulsory and the compulsory elective part of the study programme.

Academic staff regularly improve their professional and academic knowledge by participating in methodological seminars, conferences (national and international), conducting scientific and research work, as well as by participating in various projects.

4 professors of the Faculty of Civil Engineering holding a degree of Doctors of Science are involved in the implementation of the study programme:

Professor Jevgenijs Barkanovs obtained a Doctor of Engineering degree from Riga Technical University in 1993. Professor Jevgenijs Barkanovs has been specializing in application of the finite element method, as well as in structural dynamics, strength, vibration damping; participated in 10 international projects, the author of 154 publications.

Professor Ainārs Paeglītis obtained a degree of candidate of technical sciences from Riga Polytechnical Institute and a Doctor of Engineering degree from Riga Technical University in 1992. Professor has been specializing in safety and durability of bridge structures, research of dynamic properties of bridges. Professor Paeglītis is the chief editor of the scientific journal “The Baltic Journal of Road and Bridge Engineering” (https://bjrbe-journals.rtu.lv/). He managed 19 RTU projects, is the author of 91 publications.

Professor Atis Zariņš obtained a Doctor of Engineering degree from Riga Technical University in 2006. Professor has been specializing in spatial design and research of cover beam loads, the author of 26 publications.

Professor Juris Smirnovs obtained a degree of candidate of technical sciences from Moscow Automobile and Road Construction Institute in 1989 and a Doctor of Engineering degree from Riga Technical University in 1992. Professor has been specializing in road traffic safety and road coating research. Professor Juris Smirnovs is an editor of the scientific journal “The Baltic Journal of Road and Bridge Engineering”, the author of 59 publications.

All members of academic staff working at the study programme are listed in the table in the Annex.

Implementing the professional master's study programme requires teaching staff, both with achievements in professional activity – in the design, construction, monitoring and maintenance of

roads and bridges, and with advances in science to ensure the academic quality of the study process. For example, in the programme's implementation, we have involved assistant professor Janis Bidzans, who has projected a large part of the streets of Riga and has recognised authority in his sector. On the other hand, the programme is carried out by Professor Atis Zarins, who has perfected the spatial design methods of the roads, studied scientific articles and recognised a scientist. The varying qualifications of teaching staff – professionalism and scientific qualifications – allow for creating a balanced team of teaching staff to reach the aims and tasks of study.

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

4 professors – Doctors of Science, whose scientific and academic qualifications corresponds to the regulations on the criteria for the election in the professor position, are involved in the implementation of the study programme.

1 elected associate professor – Doctor of Science, whose scientific and academic qualifications corresponds to the regulations on the criteria for the election in the position of an associate professor, is involved in the implementation of the study programme.

Furthermore, 7 assistant professors and 1 lecturer are involved in the implementation of the study programme.

During the reporting period, the changes were insignificant. Analysis showed that this happened for a variety of reasons:

1. The associate professors and assistant professors advanced their qualifications over the reporting period and became professors or associate professors, respectively;
2. The academic staff took part in grant competitions, and received funds and opportunities to conduct the research in the field, thus changing their academic position to a leading researcher position;
3. New industry specialists were recruited to promote introduction of advanced technologies in the study courses; thus, lecturers and assistants came to work in the programme.
4. Retirement of some members of academic staff;
5. Termination of employment due to commencing work in the construction sector in order to improve own qualification.

The overall changes during the reporting are given in table 4.1.1.

Table 4.1.1. Academic personnel involved in implementation of the study programme

Academic position	Academic year 2016/17	Academic year 2020/21

Professor	4	4
Associate professor	2	2
Assistant professor	7	8
Lecturer	0	1
Leading researcher	2	2

The table shows that the programme involves new qualified members of the academic staff, thus maximally adjusting the programme curriculum to the specifics and latest development in the sector.

Currently, RTU is implementing SAM 8.2.2 project on "Strengthening of Academic Personnel of Riga Technical University in Strategic Specialisation Areas" financed by the European Social Fund, one of the tasks of which is the renewal of academic personnel. The aim of the project is to strengthen RTU academic personnel in the areas of strategic specialisation in 10 study fields, including the study field "Architecture and Civil Engineering". The project activities are focused on three areas:

- Involvement of Doctoral students in the work of the academic staff at RTU,
- Involvement of foreign academic staff in the work of the academic staff at RTU,
- Improvement of the existing academic staff qualifications, including academic staff internship at an economic operator.

Within the project, academic staff have an opportunity to develop their competence at the courses in professional English, as well as specialized training courses.

In order to ensure and increase the impact of scientific activities and personnel development, RTU management signs an annual agreement with each RTU faculty, which sets specific quantitative indicators in the areas of studies, scientific activities and valorisation.

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

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

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

Within the study programme, there is a cooperation stimulation mechanism for academic staff that provides enhancement and integration of the study courses. Both student survey results and alumni survey results allow getting feedback, which identifies certain shortcomings. Thus, the study courses are improved on a regular basis, considering both student suggestions and industry development trends.

During reconciliation of the study courses, all relevant academic staff are involved, ensuring that the themes considered within the study programme are continuously updated and optimized in cooperation with the associated industry professionals.

Cooperation of the academic staff within the study programme is considered to promote achievement of the learning outcomes. Reviewing and updating the study programme, the academic staff mutually agree on the most appropriate and effective solutions for evaluation of the learning outcomes and achievement of performance indicators. Periodical discussions and review of the study course syllabus help achieve thematically harmonized and complementary training, avoiding duplication of questions discussed in different courses within one study programme.

The rate of the RTU elected and permanently employed academic staff to students at the professional Master study programme “Transportation Engineering” is approximately 1 to 5.

Annexes

III - Description of the Study Programme - 3.1. Indicators Describing the Study Programme		
Sample of the diploma and its supplement to be issued for completing the study programme	Diploma example RBGT0 with atachement 1 un 2_5 year studies.pdf	Diploma paraugs RBGT0 ar pielikumu 1 un 2_5 gadu studijam.pdf
For academic study programmes - Opinion of the Council of Higher Education in accordance with Section 55, Paragraph two of the Law on Higher Education Institutions (if applicable)		
Compliance of the joint study programme with the provisions of the Law on Higher Education Institutions (table) (if applicable)		
Statistics on the students in the reporting period	RBGT0 5.pielikums EN.pdf	RBGT0 5.pielikums Magistri.pdf
III - Description of the Study Programme - 3.2. The Content of Studies and Implementation Thereof		
Compliance with the study programme with the State Education Standard	RBGT0 6. pielikums_Mg_EN.pdf	RBGT0 6. pielikums.pdf
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard or the requirements for professional qualification (if applicable)	RBGT0 7. pielikums_ENG maģistri.pdf	RBGT0 7. pielikums_maģistri.pdf
Compliance of the study programme with the specific regulatory framework applicable to the relevant field (if applicable)	Compliance the specific regulatory framework.pdf	Atbilstība specifiskajam normatīvajam regulējumam.pdf
Mapping of the study courses/ modules for the achievement of the learning outcomes of the study programme	RBGT0 8.pielikums ENG.pdf	RBGT0 8.pielikums.pdf
The curriculum of the study programme (for each type and form of the implementation of the study programme)	RBGT0 9.pielikums ENG.pdf	RBGT0 9.pielikums.pdf
Descriptions of the study courses/ modules	10. pielikums_BGT0_EN.docx	10. pielikums_BGT0.docx
Description of the organisation of the internship of the students (if applicable)	Internship_Management_Procedure.pdf	Prakses_organizesanas_kartiba.pdf
III - Description of the Study Programme - 3.4. Teaching Staff		
Confirmation that the academic staff of the doctoral study programme includes not less than five doctors, of which at least three are experts approved by the Latvian Council of Science in the branch or sub-branch of science in which the study programme intends to award a scientific degree (if applicable)		
Confirmation that the academic staff of the academic study programme complies with the requirements specified in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions (if applicable)		

Civil Engineering (42582)

Study field	*Architecture and Construction*
ProcedureStudyProgram.Name	*Civil Engineering*
Education classification code	*42582*
Type of the study programme	*Professional bachelor study programme*
Name of the study programme director	*Baiba*
Surname of the study programme director	*Gaujēna*
E-mail of the study programme director	*baiba.gaujena@rtu.lv*
Title of the study programme director	*Asoc. profesore/ Dr.sc.ing.*
Phone of the study programme director	
Goal of the study programme	*The aim of the professional bachelor study programme is to ensure 2nd level professional higher education in the branch of construction, in order to prepare engineers for independent work as well as to ensure professional bachelor`s degree that gives a possibility to continue studies in professional / academic undergraduate study programmes.*
Tasks of the study programme	*During professional bachelor studies students will acquire:* *- technical literature research and analytical skills in the branch of civil engineering;* *- skills to use theoretical knowledge for formulation of viewpoint on specific tasks and solutions in the branch of civil engineering;* *- skills to obtain and use experimental data and relevant programs;* *- at least 26 weeks long practical work experience.*
Results of the study programme	*Graduates of study programme:* *- are able to demonstrate a comprehensive knowledge of facts, theories and patterns necessary for personal growth and development, civic participation, social integration and continuing education;* *- are able to understand in detail and demonstrate knowledge of a wide variety of specific facts, principles, processes and concepts in a given field of study or professional activity in standard and non-standard situations;* *- are familiar with technologies and methods for carrying out learning tasks or work assignments;* *- are able to plan and organise work, use a variety of methods, technologies, devices, tools and materials to carry out tasks;* *- are able to find, evaluate and creatively use information to perform learning or professional tasks and solve problems;* *- are able to cooperate, plan and carry out learning or professional tasks individually, in a team or as part of a team.* *The Bachelor's professional studies provide knowledge that constitutes a high level of culture and intelligence, enabling the student to engage in social and professional activities and to have contact with academic and professional circles in Latvia and abroad.*

Final examination upon the completion of the study programme	*Bachelor Thesis with Engineering Design Project*

Study programme forms

Full time studies - 4 years, 6 months - latvian

Study type and form	*Full time studies*
Duration in full years	*4*
Duration in month	*6*
Language	*latvian*
Amount (CP)	*180*
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 Civil Engineering*
Qualification to be obtained (in english)	*Civil Engineer*

Places of implementation

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

Part time extramural studies - 5 years - latvian

Study type and form	*Part time extramural studies*
Duration in full years	*5*
Duration in month	*0*
Language	*latvian*
Amount (CP)	*180*
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 Civil Engineering*
Qualification to be obtained (in english)	*Civil Engineer*

Places of implementation

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

3.1. Indicators Describing the Study Programme

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

Professional Bachelor Study Programme "Civil Engineering", classification code 42582. Accredited by the decision of the Accreditation Commission of LR Ministry of Education and Science of 29 May, 2017 – accreditation certificate No. 2020/39.

The recommendations made for improvement of the study programme in the previous period have been taken into account and the following amendments have been made:

1) Part Internship of the study programme was amended, formulating learning outcomes, which were integrated into the learning process. For instance, if a student undergoes internship at a company, which conducts civil works, then the Internship is attached to the study courses in technologies and occupational safety, but if the internship is done at a company that carries out structural design, then it is attached to the courses in timber, metal and reinforced concrete structural design. The description of the study courses defines the aims, tasks and learning outcomes. In addition, the supervision offered by the academic staff throughout the study course is provided in the form of consultations.

- A new study course BBR752 Technical English for Civil Engineers has been included in the study programme, where students can enrich and improve their professional reading skills working with specialized texts and developing their business English speaking and writing skills and competencies. Moreover, a new study course HFL433 Presentation skills has been added, which will promote student skills and proficiency in performing in front of an audience, which will consequently improve both final examination grades and diploma grades.
- Furthermore, according to the provisions in force, other study courses have been improved and new ones were elaborated, so as to improve the quality of the study programme and its compliance to the highest European standards of education. Such courses as BTG711 Building information modelling, SDD700 Innovative Product Development and Entrepreneurship, BTM712 Properties of construction materials and manufacturing technologies have been included in the study programme.
- Current industry trend-related changes have been made to the study courses BBK728 Basics of Structural Design, BBM717 Structural Analysis, BBR745 Construction Technology.

During the reporting period, the following courses were excluded from the list of the study courses: HFA101 Sports, BBK428 Testing of structural materials, IET103 Economics, BMT305 Building Chemistry, DIM203 *Supplementary Mathematics* (civil engineering), ĶPI103 Basics of Materials Science, BBK383 Timber and Plastic Structures, IBO491 Economics of Building Construction, BMT456 Protection of Environment in Civil Engineering and BMT463 Technological Design, etc.

Also, due to changes in the qualification structure of the branches and the legislation of the Republic of Latvia, the professional qualification obtained in the professional bachelor study program "Civil Engineering" was adjusted from "Civil engineer" to "Building civil engineer".

During the reporting period, the implementation options in the Professional Bachelor's study programme have been changed, as during this period no students were enrolled in the Part-time full-time studies and Part-time extramural studies and there was no interest in these study programme implementation options, which shows that the available Full-time and Part-time studies' options are relevant for the modern student and this fully ensures the required number of students in the programme and also ensures a quality study process and graduate knowledge. Also, during the reporting period, a new Bachelor's level study programme was created for the foreign student stream and is implemented only in English, thus ensuring that the Bachelor's level programmes have two streams - English and Latvian, therefore the English option is no longer implemented in the Professional Bachelor's study programme. By enhancing the quality of studies and by aligning each programme to national and European standards, the change in implementation options will increase both student interest in the programmes and the overall level of skills, knowledge and competences of graduates.

Outlines and descriptions of the study courses are given in Annexes 9 and 10.

Implementation of the study programme offers full-time and part-time correspondence studies. The study programme is implemented in Latvian, in Riga.

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

The Professional Bachelor Study Programme "Civil Engineering" has been developed in accordance with the Law on Higher Education Institutions of the Republic of Latvia and the Classification of Education of the Republic of Latvia.

The principles of the Latvian Qualifications Framework (LQF) and the European Qualifications Framework (EQF) are maximally observed during the implementation and development of the study programme.

The study programme has been developed taking into account strategic objectives of RTU, market supply and potential demand.

The title of the study programme, the awarded degree, professional qualifications, aims and tasks are interrelated. The curriculum has been systematically designed to let alumni develop their careers at the enterprises that operate in construction sector both as civil works managers, and as civil engineers, as well as in other industry related jobs.

The study programme enrols candidates with the secondary or compatible education.

The study programme can also enrol RTU students that completed a three-year first level professional education in civil engineering. When matriculating RTU students with the first level higher professional education in civil engineering at professional Bachelor studies, the previously covered subjects are aligned. Bachelor matriculation procedure is regulated by the approved RTU Senate "Enrolment rules for academic and professional undergraduate study programmes".

Alumni of the study programme:

- are able to start their individual career or continue studies pursuing academic or professional Master degree; - able to master civil engineering related theories, consistent patterns and technologies;
- are able to demonstrate comprehensive knowledge of facts, theories and patterns, necessary for personal growth and development, civil participation, social integration and further education;
- are able to understand in detail and show the knowledge of various specific facts, principles, processes and notions for certain regular and irregular situations in academic or engineering fields;
- know technologies and techniques needed for fulfilment of learning or work tasks;
- are able to plan and organize work processes using different methods, technologies, tools and materials for fulfilment of tasks;
- are able to find, evaluate and use creatively the information in learning or professional tasks and for problem solving;
- are able to cooperate, plan and fulfil learning or professional tasks working individually, in a team or managing team work;
- are able to develop autonomously and improve their professional skills.

The study programme is professional; thus, it always offers learning field trips and exchange of practical information at the enterprises and practical classes to improve skills and competences of students according to the set learning outcomes of the study programme.

The study programme promotes implementation of the leitmotif of Riga Technical University (RTU) as defined in its 2021-2025 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 educated and trains European and global-level engineers – leaders: developers of new technologies.” (Strategy | Riga Technical University (rtu.lv)).

The study programme fully complies with the development aim of RTU Faculty of Civil Engineering – to become an internationally recognized leading Latvian educational, research and development institution in the field of civil engineering, providing high quality study process, internationally recognized research and sustainable innovation, commercialization and knowledge transfer for economic development.

The duration of the study program is 4 years and 6 months full-time or 5 years part-time. Its amount is 180 CP, which includes compulsory study courses, compulsory elective study courses, elective study courses, also practical placement and state examination, which include a Bachelor Thesis with engineering design project. It is possible to study the study program full-time and part-time, which is highly valued and used by employees already working in the construction industry, who also have the opportunity to obtain higher education in parallel with work in the industry.

After 4 years and 6 months in the professional bachelor's study programme, the student obtains the qualification of civil engineer, which corresponds to the professional standard PS-186 (https://registri.visc.gov.lv/profizglitiba/dokumenti/standarti/2017/PS-186.pdf (In Latvian)), approved in 2021.

Programme code 42582 complies with Cabinet of Ministers Regulation No 322 Latvian Classification of Education. The first and second levels of classification, represented by the first two digits of code 42, are Second-level vocational higher education (fifth-level vocational qualification and

professional bachelor's degree) or Second-level vocational higher education (fifth-level vocational qualification), to be followed by general or vocational secondary education. The third, fourth and fifth levels of classification (thematic groups, subject areas and programme groups), denoted by the next three digits 582, are Civil Engineering (58 stands for Architecture and Civil Engineering).

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

Highly qualified professionals, namely, civil engineers, of the professions subject to the national regulation are trained in the majority of **The Professional Bachelor Study Programme "Civil Engineering"**.

Professionals educated within the scope of the study program involve in processes aimed at improving, maintaining and transforming the quality of the living space of the society, and implementation of the study program comprised therein is based on complex knowledge and understanding of the interaction of technical, social and economic factors in creating sustainable environment. These principles conform to the long-term interests of the Republic of Latvia and RTU strategy guidelines.

The study program comprised by it conform with the strategic development directions of the university, the needs of the public and the national economy and development trends. All the programs include the requirements of the Latvian and the European Union legislation.

The economic and social substantiation of the study program is based on performed industry surveys, which are regularly performed on annual basis by the Ministry of Economics, and it is aimed at following up the development trends of the civil engineering field, including fluctuations in the increase of the construction and the indices of increase of the construction costs, in order to identify factors hindering development of the industry and eventual overheating risks in a timely manner, as well as forecasting the production scope and costs in the next years by applying forecasting methods. The survey reveals that during the whole period from 2020 to 2024 the experts and combined forecasts predict further increase of the industry costs. During the period from 2020 to 2022 this increase could be estimated within a range of 1% to 5% per year, and in 2024 it could achieve 6%. According to the forecast the biggest increase of costs relates to labour costs where the combined forecast predicts a general increase of 8% to 10% per year over the period from 2020 to 2024. As regards sub-fields, in 2020 a decrease of the industry costs is predicted in the construction of residential and non-residential buildings, as well as in the construction of roads and highways. The most rapid increase is predicted in the construction of bridges and tunnels. An increase of costs in all the sub-fields is forecasted as from 2022 by the construction of bridges and tunnels leading with an annual increase of 5-7%.

The industry researchers have concluded that also defects and deficiencies in construction design documents and insufficient scope of preliminary studies present risks of increase of prices on the level of individual sites in the industry of architecture and civil engineering. In order to mitigate this risk, it is important to implement the building information modelling (BIM) system in Latvia as soon as possible, as it can considerably improve the quality of construction design documents, contribute to predictability of construction, optimise organisation of construction works and their sequential performance, reduce construction terms and improve efficiency of project management and supervision.

The civil engineering industry has experienced very fast development as from 2017. Its growth amounted to 19.4% in 2017 and to 21.9% in 2018; construction volumes increased in all the core groups of construction during the last year. Both availability of the EU funding and private investment encourage the industry growth. Attraction of employees in the industry has restarted since 2018, the number of employees was 74.6 thousand last year accounting for 30% increase compared to 2010, however, the pace of the growth was lagging behind that of the production growth. The wages of employees have increased considerably in the industry during the last two years and last year they amounted to 94.6% of the mean wage in the national economy.

When analysing the employment of graduates, it should be noted that they are mainly employed in private companies, municipal development departments and construction boards, design companies, public administrations and other sector-related organisations. These include "Skonto Būve" Ltd, "Merks" Ltd, "UPB" JSC, international companies such as Hilti, Peri, Knauf, Riga Construction Board and other construction boards. Many students find a job during their internship, and around 90% continue to work in their internship after graduation.

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

During the reporting period, **the Professional Bachelor Study Programme "Civil Engineering"** was implemented in Latvian on a full-time and part-time extramural basis.

Number of students:

As of May 2021, the total number of students at the study programme "Civil Engineering" was 685 students, which is ~10% less than in 2017. Taking into account the statistics for the students enrolled in recent years, it could be said that the number of full-time students is growing, but for part-time studies it has been almost stable.

For detailed information about distribution of students see Chart 1 and 2 in Annex 5.

Breakdown by the source of funding:

In the academic *year* 2020/2021, *the correlation between state funded seats and studies for tuition fees was* 85 to 15. Such a ratio between the budget funded seats and studies for tuition fees is observed with very few annual fluctuations, as, for example, in academic year 2016/2017 it was 82 to 18. For comparison by the source of funding, by the number of students and percentage for the reporting period see Charts 3 through 9 in Annex 5.

Number of alumni:

In the academic year 2019/2020, 70 alumni were awarded a professional Bachelor degree in civil engineering (see Chart 10 of Annex 5). Compared to academic year 2016/2017, the number of alumni did not decrease, which can be estimated as a positive indicator.

Drop-out rates:

In the academic year 2019/2020, 70 students were extramatriculated due to different reasons, which is more than by half less than in the academic year 2016/2017. For precise comparison of full-time and part-time students drop-out rates by years and courses see Chart 11 and 12 in Annex

5.

The main reasons for drop-out:

- failure to pass the study courses, for example, in academic year 2016/17, 165 out of 171 students were extramatriculated exactly due to academic underachievement, while in 2017/18 - 78 out of 97, but in 2019/20 - 94 out of 124 students;
- students understand that the chosen industry does not meet their expectations, for example, in academic year 2017/18, 11 students left studies for this reason, but in 2019/20 - already 27 students;
- students leave studies due to social and family circumstances, especially common amongst part-time students of 2–5 years of studies, whose number varies from 5 to 10 students during the reporting period;
- due to financial reasons, which is also related more to part-time studies, for example, in academic year 2019/20 there were 13 students who dropped out for this reason;
- due to epidemiological situation, which affected the studies directly during the last terms, students admitted that they fail to study online and fail to pass the study courses.

But students also renew studies after expulsion due to all above mentioned reasons, which is estimated as a good indicator. For example, in academic year 2016/17 there were 104 students, but in academic year 2020/21 there were 56 students. For comparison of full-time and part-time extramural (correspondence) students by courses and academic years see Chart 13 and 14 in Annex 5.

Full-time students of the study programme are offered an opportunity to take part in the international student exchange (mobility) project *Erasmus+*. However, the language of instruction of the offered programme is Latvian, thus foreign students cannot apply for this programme.

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

3.2. The Content of Studies and Implementation Thereof

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

The goals of **the Professional Bachelor Study Programme "Civil Engineering"** are:

- to educate and train competitive engineers in civil engineering who can exercise their profession in practice;
- to train students for individual scientific research and further professional/ post-graduate studies.

The syllabus of the study courses is based on the aims and learning outcomes of the study course, which for their part derive from the aim and learning outcomes of the programme. Such interrelation is clearly seen from the mapping of the study programme (Annex 8).

All study courses in the programme are divided into 6 blocks:

Section A (116 CP) – Compulsory study courses divided into sub-sections – basic study courses, basic profession-oriented theoretical courses and IT study courses, as well as professional specialization study courses.

Section B (18 CP) – Compulsory elective study courses divided into sub-sections – professional specialization study courses, study courses in humanities and social sciences, and languages.

Section C (6 CP) – Elective study courses.

Section D (20 CP) – Internship.

Section E (20 CP) – Final / state examinations, which include a Bachelor Thesis including an engineering project.

Each study course has a defined aim and learning outcomes to be achieved. All knowledge, skills and competences in the study course are related and subordinated to the aims and expected learning outcomes of the study programme. The plan of the study programme is given in Annex 9, the descriptions of the study courses – in Annex 10. Each study course provides acquisition of 1 through 5 programme outcomes. Each programme outcome corresponds to at least 1 study course, but on average these are 5 or more courses.

Prior to the start of an academic term, each member of the academic staff has to examine the course description, assessing the existing aims of the course and the expected learning outcomes, and has to examine the learning materials and literature, make sure that the literature is up-to-date and includes the advanced research in the field. Analysis of compliance of the curriculum of the study programme "Civil Engineering" to the state standards allows concluding that the programme complies fully to the requirements. For compliance of the study programme to the state education standard see Annex 6 and for compliance of the study programme to the professional standard see Annex 7. To provide the cross- complementarity of the study courses, as well as to avoid duplication, the academic staff discusses regularly the structure of the study programme. The descriptions of the study courses are available on *ORTUS* platform, so the academic staff has access to descriptions of other study courses which ensures their interconnection.

The Professional Bachelor Study Programme "Civil Engineering" is in line with construction trends in the EU and worldwide. During its development, the changes in the construction industry in Latvia and across Europe were studied. The main emphasis was placed on the introduction of new technologies in the teaching process, as well as training students in the use of building information modelling already in the course of study. The EU Building Information Modelling (BIM) representatives stress that BIM is a new opportunity that the digital age offers to significantly increase the construction quality and productivity, and therefore the introduction of BIM in the study programme is also essential. Construction using a BIM approach is more reliable and productive, as it allows those involved in construction to use the available resources - both human

and financial - more efficiently.

Different study courses are interrelated and results of one course have an impact on the tasks in the following course, they are cross-linked based on building information modelling. For instance, within the course BRC396 Basics of Architectural Design the learning outcomes are directly linked to the tasks of the course BBR344 Construction Technology and Safety (study project).

The study programme is being improved to make it appealing for young professionals. Research and analysis are carried out considering other universities across different European regions in order to improve the study programme as comprehensively as possible. The study courses within the study programme are based on general trends in construction industry – they are included in the study courses, also the general professional understanding of the study courses needed to be mastered by the professionals in the field is also covered. The study programme is modern and follows the latest trends outside Latvia, as well as it is specific enough in Latvia to claim that it has its own well-defined place in the family of other study programmes in the field of engineering sciences.

The academic staff of the programme regularly follow and update the study courses so that they are based on the achievements and acknowledgements of the respective field of science. Course descriptions will be approved by the Programme Director and the Head of Department prior to the start of each semester to keep abreast of academic staff workload and possible development. The teaching staff also update the content of study courses in accordance with the trends of scientific development, using information available in the databases of scientific articles - EBSCO, Emerald, Scopus, Web of Science, etc. Academic personnel are motivated to publish the results of their research, especially in the scientific databases SCOPUS and Web of Science, with a royalty for each article published in these databases. The results of the academic staff development are evaluated each year during the annual appraisal and the results are used to plan further professional advancement of each member of the academic staff.

Based on the information from the Central Statistical Database, it may be concluded that the demand for highly qualified specialists in civil engineering is variable, yet growing spirally, which is impacted directly by the global economic situation, nevertheless in the future it is expected only to increase, thus allowing to conclude that the study programme is important and significant in promoting economic activities in Latvia and Europe (see Table 2.1.).

Table 2.1.

Employees by type of economic activity

Industry	Number (thsd)				
	2016	2017	2018	2019	2020
Agriculture, forestry and fisheries	68,7	61,4	63,3	66,3	64,3
Mining and quarrying	3,4	2,3	3,0	3,2	2,7
Manufacturing	123,5	120,9	116,9	115,1	114,5

Electricity, gas, steam and air conditioning supply	14,0	13,1	12,3	9,4	10,7
Water supply, sewerage, waste management and remediation activities	8,3	9,1	7,9	6,7	6,2
Civil Engineering	**66,1**	**63,1**	**74,6**	**81,1**	**76,5**
Information and communication services	23,8	28,3	29,0	25,6	31,1
Operācijas ar nekustamo īpašumu	21,4	19,8	20,4	21,7	19,7
Professional, scientific and technical services	33,6	39,6	36,3	33,4	37,0
Education	81,7	82,3	83,3	83,3	81,6
Other services	19,9	20,9	18,2	16,4	21,2

Furthermore, the study programme is improved after evaluation of the final examinations, as representatives of employers regularly take part in the work of Graduate Paper Examination Committees to assess the knowledge acquired by students within the study programme. Participating in the work of the Graduate Paper Examination Committees representatives from the industry can express their suggestions concerning the desired topics for student research in demand in the labour market. These recommendations are taken into account while improving the courses of the study programme for the next academic year.

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

Not relevant!

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

process.

Each study course of the **Professional Bachelor Study Programme "Civil Engineering"** defines the knowledge, skills and competences to be acquired, which contribute to the achievement of the learning outcomes of the study programme. The forms of assessment shall be determined by the academic staff in accordance with the learning outcomes of the study course. Each instructor within their study course tests the knowledge, skills and competences of the students specified in the course description (papers, tests, presentations, independent works, case study analyses, group works, etc.). The final grade is the sum of all test papers and examination grades, the percentages of which are also indicated in each course description and presented to students at the beginning of the semester.

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 in ORTUS portal beforehand. During semester, the assessment for each home task, test, report, presentation and any other task is ascrbed 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 program and learning outcomes are taken into consideration.

Most commonly, to assess knowledge and to demonstrate what one has learned within the study course, tests or assignments are used. Skills are assessed mostly through practical, analytical, creative individual and group assignments that require the student to apply the acquired knowledge in practice. In turn, students demonstrate the acquired competences by presenting, discussing and justifying what they have learned in the course, both orally and in writing.

The acquisition of knowledge, skills and competences within the study programme includes theory, practical examples, lectures, group assignments, interactive discussions, and lectures by guest lecturers from the industry.

The Professional Bachelor Study Programme "Civil Engineering" is implemented on a full-time and part-time studies, with the number of examinations being determined by the amount of credit points within each course.

The organisation of the study process differs between the two study options. Full-time studies take place mostly on weekdays, while part-time studies take place on weekday evenings or weekends. The difference in contact hours can be seen in the course descriptions and in the timetable, where the total duration of study is 6 months longer than in full-time studies. The outcomes to be achieved are the same for both options, the information to be learned is also the same, but only the implementation option and the timing are different.

All study courses included in the study programme are implemented in accordance with the course descriptions. The study courses are evaluated in accordance with the RTU Senate Decision of 29 March 2010 "On the Regulations for Evaluation of Learning Outcomes", the RTU Senate Decision of 25 May 2001 "On the Criteria for Evaluation of Learning Outcomes " and the RTU Senate Decision of 29 January 2001 "On the Transition to a Unified Evaluation of Study Results" in a 10-point system (10 - excellent, 1 - very, very poor). The examinations consist of tests, study papers and exams

according to the study plans approved for each semester.

A student can only present their graduate/Bachelor Paper once they have mastered the entire study programme curriculum. Study courses in which a negative mark has been obtained must be retaken.

The principles of student-centred education are also taken into account in the implementation of the study process, which is implemented in the following way:

- Student involvement in the study process and its development:

Riga Technical University regularly analyses the questionnaires that each student completes at the end of the semester for each course. The students also organise meetings with the programme director to discuss the positive and negative features of the semester courses, as well as the competence, abilities, attitude and quality of each member of academic staff. In this way, students have the opportunity to influence the study process and contribute to its improvement.

- Respecting students' abilities:

Academic staff take into account and respect student diversity and their needs, using different ways of delivering the programme according to students' capabilities.

- Handling student complaints:

The University has appropriate procedures in place to deal with student complaints. The complaints process is channelled through the Programme Director and the Head of Department, the Head of the Department of Studies or even the Vice-Rector for Academic Affairs, if necessary. At the Professional Bachelor Study Programme "Civil Engineering", students first solve problems with the Programme Director, thus the issues to be solved are addressed in a timely manner. For example, if the Programme Director receives a complaint from students about the inadequacy of a course or the incompetence of an instructor, the next step is to find out the reasons and attend the relevant lectures; if the students' complaint is justified, the instructor is instructed to improve the course or is replaced by an instructor whose competence is appropriate for the course.

- Academic personnel competence development:

Courses and seminars are regularly organised for academic personnel, both on pedagogical methods and on technological possibilities for improving the quality of courses and their own qualifications. RTU regulations stipulate that a member of academic staff should also deliver guest lectures at foreign universities, which also directly increases their abilities and the quality of communication. In 2021, RTU organised the following training for the personnel - training on the e-learning environment (Moodle), use of Zoom and Teams (which significantly increased the mobility of teaching staff due to the epidemiological situation), training on audio-visual systems for remote lectures, as well as regular trainings on RTU information systems (usage of ortus.lv). Any other type of training for elected academic personnel in their field is also supported.

- Teaching and learning methods:

Pedagogical methods, ways of teaching, learning and assessment are regularly evaluated. Topical issues are discussed at departmental meetings, at the meetings of the Methodological Council. At the end of the course, students evaluate the performance of each member of academic staff by completing a course evaluation questionnaire. Students have the possibility to apply for personal tutorials, which are organised either systematically every week or by appointment at fixed times. Some courses also use methods where students can self-assess and engage in group work to facilitate learning.

- Fostering student autonomy:

Studies rely on the student's autonomy, while at the same time providing guidance and support from the instructor - the description of each study course specifies the scope and content of students' independent work, as well as the methods of its assessment.

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

The Professional Bachelor Study Programme "Civil Engineering" includes Internship in the volume of 20 CP.

Internship is an integral part of a professional study programme, which is to be done according to LR regulations, the resolution of RTU Senate of 29 April, 2002 "On the structure of the second-level professional study programmes" and the resolution of RTU Senate of 28 January, 2019 "On organization of internship at Riga Technical University, new edition".

The ***aim*** of the internship is:

To develop ability to join a team, get familiarized with the technical and technological equipment of the company, prepare technical specifications and information materials, fulfil practical tasks by applying the knowledge acquired during studies.

A place for internship can be any company or organization, which allows acquiring the basics of civil engineer job related to construction project design, management, technology of construction materials, management of civil works, planning and supervision of civil works, project documentation, procedure of on-site works, experience in working with construction regulations and standards, planning of necessary activities for on-site quality control and labour safety, preparation and control of as-built documentation, supervision and analysis of the works, effective and appropriate use of resources, competence in issues of building operations, use of design software.

If students need it, RTU offers assistance of a student career specialist, who can find a suitable place of internship, but a student also can choose the place of internship individually, which is also the most popular way of finding a place for internship. After that a trilateral cooperation agreement is concluded and internship tasks are carried out during 20 weeks, the agreement states contact persons – an on-site internship supervisor and an internship supervisor at the university. At the university, the internship supervisor is the programme director or other person according to the study plan. The internship supervisor at the university ensures assistance during the internship. Before presentation of the internship report, the internship supervisor at the university reviews it and gives their comments and feedback to the student so that they could amend the internship report and prepare better for public presentation of the report.

Internship includes certain tasks, described in the internship regulation. To achieve an assessment of the internship a student presents the report, which states an internship supervisor's

(representative of the internship partner company) assessment, internship diary, and defends the internship report within a certain term according to the study schedule.

Professional internship contributes to all learning outcomes, as it is one of the final stages prior to development of a Bachelor Paper including an engineering project. During the internship, a student has to demonstrate the knowledge defined in the study programme, apply their skills and demonstrate the acquired competences. Internship can provide better reflection of student's performance than individual study courses.

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/lv/studentuserviss/karjeras-centrs-ssc/karjeras-diena (in Latvian). 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 provision of internship places to students.

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

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

Professional Bachelor Study Programme "Civil Engineering" includes a final examination – a Bachelor Paper including an engineering project in the volume of 20 CP.

The final examination implies that a student shall conduct a concrete research in the field of civil

engineering (Bachelor Paper) and develop an engineering project that includes design of a building or a building structure.

At the final examination, a student should demonstrate their professional and research skills according to the professional standard and State Regulation on Higher Level Professional Education. The student should also attest their ability to design buildings and structures, carry out calculations of structures, use modern building materials and technologies, design a *planning* and *supervision project of on-site construction works,* draw up a paper according to the requirements for qualifications papers, present it in public in front of the committee and defend the solutions stated in the project.

The procedure of Bachelor Paper development includes approval of the topic of the Bachelor Paper and the project with a scientific adviser and the head of the department. Students choose the fields of their Bachelor Papers from the sample topics suggested by each department; accordingly, the head of the department suggests an appropriate Bachelor Paper a scientific adviser competent in the chosen theme.

A student and their scientific adviser also agree upon the calendar plan, but each department has its own control terms, taking into account that both autumn and the spring academic terms consist of 16 academic weeks. One of the examples of consulting and paper development: during week 3 of the academic term a student receives from a scientific adviser an approval concerning the architectural part of the designed project and the parameters of the Bachelor Paper with the list of literature or the description of the Bachelor Paper structure on 1-2 pages. During week 8 of the academic term, the student receives from the scientific adviser an approval concerning the building part of the designed project. But in week 12 of the academic term the standard control must be carried out – prior to the examination date the completed engineering project must be sent to the head of the department or the assigned member of the academic staff. Before the engineering project is sent, it is necessary to show it to the scientific adviser and to receive their approval (signature on all drawings and the accompanying description part). Also, during week 12, a student should complete the Bachelor Paper comprising literature review and setting the aim of the paper and subordinated tasks thereof (Bachelor Paper is ~50% ready), showing it to the scientific adviser. During week 16 of the academic term, the student must receive an approval from the scientific adviser about the developed Bachelor Paper. Accordingly, the scientific adviser, having signed the Bachelor Paper with the engineering project, informs the head of the department that they recommend the paper for the Viva Voce Examination.

Viva Voce Examination is planned two times a year – at the end of January and at the beginning of June.

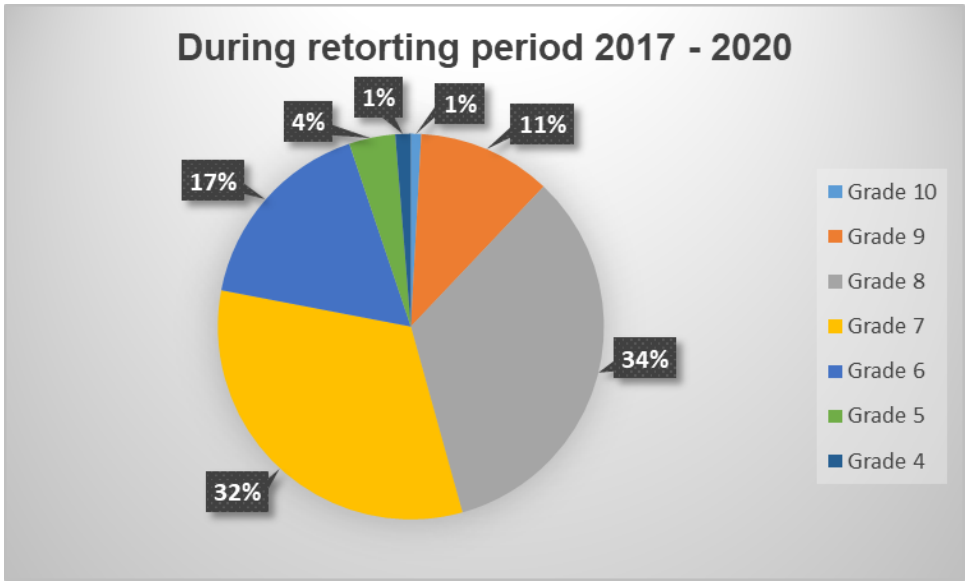
The examples of the themes of Bachelor Papers over the last years are as follows:

- Opportunities of augmented reality and computer vision application to civil engineering.
- Zero-energy buildings in urban environment.
- Building information system (BIS).
- Development and possible application of automated design in civil engineering.
- Application of augmented and virtual reality to improve efficiency and outcomes of building construction processes.
- Location-based time table development for construction activities using integration with a 3D model.
- Development of Magnesium Oxide building material, using dolomite waste.
- Economic comparison of pre-fabricated and cast-in-situ reinforced structures in the Latvian construction sector.
- Analysis of steel lattice girder resistance.

- Comparison of reinforced concrete pile load calculation techniques.
- Steel rope roof function analysis.
- Analysis of rational CLT floor panel opportunities.
- Evaluation of explosion impact on high rise reinforced concrete loadbearing structures.
- Application of tribology and testing to concrete materials.
- Recycling of concrete waste and production of raw materials for new concrete and reinforced concrete.
- Applications of nanochemistry in construction materials.

Analysing the wide range of topics, it can be concluded that both teaching staff and students demonstrate their skills, knowledge and competences at a very high level and in line with the topicality of the field. The choice of topics is based on the student's interest in current developments in the field and on the student's preferences for future career choices, and the final thesis topics owe to the sustainability and development of the programme as a whole.

Bachelor Paper assessment grades during the reporting period on average varied from 7,18 to 7,45. The breakdown is shown in the chart.



In 2020, 54 alumni graduated from the programme with an average grade of 7.41, whereas grade 9 was awarded to 7 alumni, grade 8 – to 18 alumni, grade 7– to 20 alumni, grade 6 – to 8 alumni and grade 5– to 1 graduate. In 2019, 55 alumni graduated from the programme with an average grade of 7.45, whereas grade 9 was awarded to 6 alumni, grade 8 – to 23 alumni, grade 7– to 18 alumni, grade 6 – to 6 alumni and grade 5 – to 2 alumni. In 2018, 57 alumni graduated from the programme with an average grade of 7.19, whereas grade 10 was awarded to 2 alumni, grade 9 – to 5 alumni, grade 8 – to 15 alumni, grade 7 – to 18 alumni, grade 6 – to 15 alumni and grade 5 – to 1 graduate and 1 graduate received grade 4. In 2017, 66 alumni graduated from the programme with an average grade 7.18, whereas grade 9 was awarded to 8 alumni, grade 8 – to 22 alumni, grade 7 – to 19 alumni, grade 6 – to 10 alumni and grade 5 – to 5 alumni, 2 alumni received grade 4.

3.3. Resources and Provision of the Study Programme

3.3.1. Assessment of the compliance of the resources and provision (study provision, scientific support (if applicable), informative provision (including libraries), material and

technical provision, and financial provision) with the conditions for the implementation of the study programme and the learning outcomes to be achieved by providing the respective examples.

RTU Faculty of Civil Engineering (FCE) continuously monitors compliance to quality requirements of rooms and technical equipment, the appropriate lecture halls with necessary multimedia hardware have been equipped. In general, in the FCE building at 6A Ķīpsalas Street 4 computer rooms, 23 lecture rooms, 35 laboratory rooms are available for the needs of the study process. In order to ensure the qualitative study process, FCE is carrying out extensive refurbishment works, upon their completion the Faculty will meet international standards for campuses and lecture halls. Classification of the premises is given in the table below.

Room type	Number of rooms	Useful area m²
Meeting room	1	70.91
Computer rooms	4	243.77
Auditoriums	23	1702.34
Teachers' rooms, cabinets	69	1523.61
Assistant professor / Doctoral student premises	5	196.24
Workspace / workshop	6	172.19
Research facilities	6	350.53
Laboratories	35	1256.83
Resource room	6	213.53
Auxiliary room	11	197.99
Anteroom	3	35.89
Student self-government and record keeping	3	260.43
Kitchen	1	16.43
Total		**6240.69**

The study process will be mainly provided by FCE academic and technical staff in cooperation with the following RTU departments:

- Department of Engineering Mathematics;
- Institute of Technical Physics;
- Department of Chemistry;
- Department of Labour and Civil Protection;
- Department of Innovation and Business Management;
- Department of Social Sciences;
- Department of Languages for Specific Purposes.

FCE institutes provide education and learning support: develop and update descriptions of the study courses, implement the corresponding study courses (including practical and laboratory works and seminars), supervision and defence of the graduate papers, and other activities related to learning, teaching and research work.

In 2017 – 2020, substantial investments were made in the research infrastructure. For example, the Institute of Transport Engineering had acquired such equipment as a Hamburg testing device (automatic Hamburg two-wheel tracker), as well as a roller-compactor, a four-point fatigue testing machine (four-point beam bending machine), a drone with infrared camera for open-air drone-based measurements and reading, as well as a high-resolution camera for additional imaging. In 2021, the Institute of Materials and Structures in cooperation with the largest manufacturer of construction materials in Latvia – "Sakret" Ltd., established a new laboratory – 3D concrete printing laboratory equipped with a 3m x 3m concrete 3D printer. In 2020, FCE founded the Centre for Digital Building Technologies that carries out active research and training in Building Information Modelling (BIM).

The Scientific Library of RTU (Scientific Library | Riga Technical University (rtu.lv)) is an academic library of state significance, which has obtained its status as a result of library accreditation. The Scientific Library of RTU provides the necessary information for RTU study process and research activities, performs library, bibliographic and information services for RTU students, teaching staff, and employees. The Library's collection includes 1.4 million printed documents and e-resources in the databases relevant to RTU fields.

In 2016, significant investment was made in the development of the library infrastructure, with the construction of an additional 2240 m2 of space for the Central Library. The total area of the library premises is 6393 m2, of which 3417 m2 are for reader services. There are 713 workstations for library users. The library has four group rooms and six individual cubicles, a Western reading room and a conference room. The library is accessible to users with reduced mobility.

To improve the work of the Scientific Library of RTU and to ensure the availability of information needed for study and research work, the Library Council has been established, which decides on the replenishment of the library's collection with printed publications and subscriptions to the necessary databases. The Library Council has approved the "RTU SL Collection Completion Policy", which defines the basic principles of collection formation and development in accordance with the directions of RTU study and scientific activities.

When RTU provides funding for the library, the funding for information resources for each study programme is calculated. The collection is replenished according to the recommendations of the heads of study programme, researchers, and the allocated funding. The desired titles can be ordered by contacting the Library's Collection Development Department, ordering on the Library's website, filling in the order form, filling in the application form, by phone or by visiting the Library. The Scientific Library offers a guide to ordering titles and e-resources, which brings together the websites of various publishers and bookshops in Latvia and abroad.

Database subscription contracts are concluded both directly with the supplier and through the

"Cultural Information Systems Centre" state agency, which is the Latvian national representative of the international non-profit organisation EIFL (Electronic Information for Libraries, http://www.eifl.net/). The EIFL Licensing Programme offers national libraries subscriptions to internationally recognised databases at significantly reduced subscription fees not offered to individual subscribers, thus saving financial resources of the libraries.

The database subscriptions maintained by RTU Scientific Library

(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.
- Databases financed by the Ministry of Education and Science available to RTU Scientific Library: ScienceDirect, SCOPUS (Elsevier), Web of Science.
- Latvian databases: LETA, Letonika, the Database of Latvian Standards (available on the premises of the Library).

Database usage at the Scientific Library of RTU has been growing since 2016. E-resource loans have increased from 75,391 to 525,194 items.

The new library premises have allowed to extend the range of services. Since the opening of the new premises in 2018, the number of visits to the library has increased from 103,825 to 235,600. The Scientific Library of RTU is open to everyone. The Central Library is open to users from Monday to Saturday. There is a 24/7 reading room. During the summer period, the Central Library is open every weekday with reduced opening hours. (https://www.rtu.lv/writable/public_files/RTU_library_general_info_2020.pdf)

The library's sources are housed in an open-access collection. Books and periodicals according to the field of study and the UDC indexes are located in the central building of the Scientific Library, 5 Paula Valdena Street, Riga. The last copies of the oldest publications corresponding to the RTU profile are kept in the library repository. They are always available to the users.

The librarian on duty helps visitors find their way around the collection. Bibliographers (information specialists) provide more detailed information and advice. The library has a branch librarian service (https://www.rtu.lv/lv/studijas/biblioteka/nozaru-informacija (In Latvian)).

The library resource search is supported by the Primo Discovery search tool (https://www.rtu.lv/lv/studijas/biblioteka/vienota-informacijas-meklesana (In Latvian)). It allows searching the library catalogue (https://kopkatalogs.lv/F/?func=find-b-0&local_base=rtu01 (In Latvian)), the subscribed databases, as well as databases created by the RTU Scientific Library (https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/bibliotekas-veidotas-datubazes (In Latvian)) in one interface. Searching for information in the electronic joint catalogue (https://kopkatalogs.lv/F (In Latvian)), it is possible to simultaneously obtain information on the resources available in 12 Latvian libraries. Both the electronic catalogue and the RTU portal ORTUS allow remote reservation of library resources, as well as remote access to the databases. Since the introduction of RFID technology, users can use five self-service book-dispensing machines and check out books from the pick-up machines around the clock.

The library provides students, academic personnel and other stakeholders with various levels of individual consultations and group training in information literacy (https://www.rtu.lv/lv/studijas/biblioteka/lietotaju-apmacibas (In Latvian)).

Publications not available in the library are delivered via an interlibrary loan or an international

loan.

Internet access is available throughout the library. The library has copying, scanning, printing, binding services and a self-service dining room.

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

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

Both state budget financing and student funds will be used for the implementation of the study programme. Information on the expected financial resources of the programme is presented below:

Academic year	State budget funding for the programme, EUR	Tuition fees, EUR	Total study programme funding, EUR	Cost per student, EUR
2016./2017.	89 00 37.79	22 90 39.29	1 18 14 83.31	38 66.02
2017./2018.	89 77 60.59	19 94 40.88	1 13 16 22.91	40 40.66
2018./2019.	93 53 81.83	20 14 27.19	1 16 53 59.66	42 29.68
2019./2020.	1 03 72 38.95	21 88 34.89	1 26 96 92.35	44 05.04
2020./2021.	1 03 56 89,24	25 58 07,01	1 29 72 68,60	44 62,81

The analysis of the information shows that the state budget grants for the study programme have increased during the reporting period. The cost per student has increased, which is justified by the overall increase in total RTU costs (utilities, building maintenance, etc.).

Information on the minimum number of students in RTU study programmes is provided in the appendix of the self-evaluation report "On minimal number of students in study programmes".

Tuition fees are set in line with the National Audit Office's warning that tuition fees for students studying with budget students cannot be less than the public funding for this service. Part-time extramural studies do not receive State funding, so tuition fees are set taking into account a number of factors, such as the programme's ability to cover its costs, the market situation, demand

for the programme, the stage of development of the programme, etc.

Information on the funding distribution between the cost items is provided in the appendix of the self-assessment report "Funding distribution between the cost items".

The specific development of each study programme is the responsibility of each study programme director, as well as the faculty responsible. For the development of all study programmes, central funding is used for the renewal of the research library, improvement and maintenance of shared classrooms, public relations, programme marketing activities, development and maintenance of information systems related to the study process, development of the Ķīpsala complex and other activities.

In addition, see:

- Provision of study facilities in Part II, Chapter 3, Section 2.3.1.
- Provision of research facilities in Part II, Chapter 3, Section 2.3.1.
- Provision of information facilities in Part II, Chapter 3, Section 2.3.3.
- Provision of the material and technical base in Part II, Chapter 3, Section 2.3.2.

Provision of the financial basis in Part II, Chapter 3, Section 2.3.1.

3.4. Teaching Staff

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

General evaluation of the academic staff is provided by the information and CVs of the members of academic staff given in the study field report Criteria 2.3.5.-2.3.6. of Part II, Section 3. At this point, compliance of the qualifications and competencies of the involved academic staff to the requirements of the study course is considered.

The following qualitative and quantitative indicators show that the qualifications of the academic staff meet the requirements specified in Article 55 of the Law on Higher Education Institutions - 22 professors and associate professors, approved by the Latvian Council of Science, have been elected to academic positions in RTU departments and are experts in their field, participate in the implementation of the compulsory and the compulsory elective part of the study programme.

Academic staff regularly improve their professional and academic knowledge by participating in methodological seminars, conferences (national and international), conducting scientific and research work, as well as by participating in various projects.

Qualifications and achievements of the academic staff are described by departments, but not all members of academic staff of a department appear in the study programme outline. The outline is based on the load of academic year 2020/21, but the work during the reporting period and

implementation of the study courses is not possible without all department staff involved, as they participate in facilitating the study processes, research activities, and graduate paper supervision.

The Department of Building Structures unites **11** academic staff members, including **3** professors, **2** associate professors, **5** assistant professors and **1** lecturer.

For example, Professor **Leonīds Pakrastiņš** is the author of more than 100 scientific publications and learning aids, and has presented papers at more than 50 international conferences. He is the supervisor of several Doctoral, Master's, Bachelor's and Engineer's theses. Expert of the Latvian Council of Science in the fields of Civil Engineering, Transport and Traffic. He has an extensive experience in preparing and conducting lectures and training courses. As the head of the technical committee LVS TC30 "Construction", he has organized the execution of the national implementation plan of Eurocodes standards and the development of national annexes, as well as the improvement of the technical regulation in the field of building structures. He holds European Commission JRC Centre instructor training certificates for EC2 and EC6 Eurocodes. Participant and manager of several national and international projects. Member of many conference programme committees and editorial boards of international journals. Member of the RTU Senate, expert of the Doctoral Council "RTU P-06". He has been awarded the titles of RTU Professor and RTU Honorary Employee for outstanding pedagogical and scientific activity.

Professor **Dmitrijs Serdjuks** has participated in more than 60 international conferences and published more than 100 scientific and methodological papers. He is an expert of the Latvian Council of Science in the field of Civil Engineering. He is currently leading the research project "Method of correlation of coaxial accelerations in 6-D space for quality assessment of structural joints (COACCEL)" funded by the Latvian Council of Science, has participated in the international mobility programme "Visiting Professors Program, Peter the Great St. He has also participated in the International Visiting Professor Program at St. Petersburg Polytechnic University. Teaching, research, scientific activity and collaboration. 2019 - 2020". He has been awarded the titles of RTU Professor and RTU Honorary Employee for many years of conscientious and active work at the University.

Associate professor **Andīna Sprince** was awarded PostDoc grant and in May 2020 started her project realization. A co-author of 28 scientific, participated with reports at 27 international and scientific conferences, including 1 at a methodological conference. A. Sprince is a co-author of 1 Latvian patent and 7 teaching and learning aids. An expert in civil engineering in the Latvian Council of Science; has taken part in the implementation of projects guided by the Latvian Council of Science, Ministry of Education and Science and other institutions. A. Sprince raised her qualifications doing a 6-month internship at Technical University of Denmark. She is a member of editorial boards of many scientific journals. Last year she received an AFW Academy Certificate for project management. To improve her qualification, she regularly participates in different scientific and academic workshops. She works in the State Examination Committee of RTU Faculty of Civil Engineering and the Faculty of Architecture. She has been a supervisor for theses within different cycles – Doctoral, Master and Bachelor theses with engineering projects of students at the programme.

Assistant professor **Līva Pupure** was awarded a PostDoc grant, published 22 articles, including 9 conference articles and 2 book chapters (all of them are indexed in SCOPUS database), underwent the academic training course at Luleå University of Technology (Basic Course 1: The Teachers Role at Luleå University of Technology; Basic course 2: Developing as a University Teacher), as well as received an award from the society “Kungl. Skytteanska”, Sweden, as for a “young and promising researcher”.

Assistant professor **Vadims Goremikins** obtained a PhD degree in civil engineering from RTU

Faculty of Civil Engineering, after that did post-doc research at the University of Edinburg and Czech Technical University in Prague for two years, where he investigated behaviour of composite structures under fire. The author and co-author of over 30 scientific publications, reported his research results at 25 international scientific conferences and participated in 6 scientific projects, the author and co-author of 10 methodological teaching and learning publications.

Lecturer **Andrejs Pupurs** received a PostDoc grant, published 36 articles, including 19 conference articles, and 1 book chapter (all of them indexed in SCOPUS database), completed the academic training courses at *Luleå University of Technology* (Basic Course 1: The Teachers Role at Luleå University of Technology; Basic course 2: Developing as a University Teacher).

At **the Department of Construction Mechanics,** there are **4** academic staff members involved in the implementation of study courses, including **1** associate professor, **1** senior researcher, **1** assistant professor and **1** lecturer.

Associate Professor **Jānis Šliseris** has co-authored more than 45 scientific publications and presented papers at more than 30 international conferences. He spent two years as a research fellow at the Fraunhofer Institute for Industrial Mathematics in Germany. Supervisor of Doctoral, Master's, Bachelor's and Engineer's theses. Expert of the Latvian Council of Science in Construction and Transport Engineering. Leader and chief executor of the international project ERANET ELAC2015/T02-0721 "Development of ecofriendly composite materials based on geopolymer matrix and reinforced with waste fibers". Participated in several RTU, LCS and international (ERDF, ESF) scientific projects, the scientific results of which have been published in international journals and conference proceedings, co-author of 3 patents. The construction material developed by J. Šlisers and his team won the first prize at the International Invention and Innovation Exhibition MINOX. He was awarded the honorary title "RTU Young Scientist of the Year 2017" for outstanding scientific activity.

Associate professor and leading researcher at RTU, Institute of Civil Engineering and Reconstruction **Līga Gaile** is an expert in the Technical Committee of LVS TC30 “Civil Engineering”. Participated in the national plan of Eurocode standard implementation and elaboration of national annexes, as well as in elaboration of technical regulations for building units, certified by LR Ministry of Economics letter of recognition of 2015 for significant contribution. In the same year, the Latvian Association of Civil Engineers expressed their recognition in the nomination “Education and training of young civil engineers”, but in 2018 she was awarded a prize in the nomination “Best research paper, study book, publication in civil engineering and patent in civil engineering technology of the year”. As a whole, she is a co-author of 19 scientific publications. To improve her qualifications, she regularly participates in different scientific and academic workshops. She also received a PostDoc grant.

Lecturer **Līga Radiņa** is a co-author of 14 publications and has participated in 8 scientific projects. L. Radiņa took part in organization of IMST 2015 “Innovative Materials, Structures and Technologies”. Last year she received an international AFW Academy certificate for project management, but this year a licence for professional training “Project management using Agile, Scrum, Lean, Kanban”. Regularly participates in different training workshops on adult education. In 2019 received RTU SP prize as “The Lecturer of the Year” of the Faculty of Civil Engineering.

At **the Department of Computer Aided Engineering Graphics,** there are **4** teaching staff members, **1** academic, **1** assistant professor, **1** practical assistant professor and **1** lecturer.

The academic staff of the department has organized four international conferences on the topics of the courses taught by the department. All academic staff of the department has scientific publications, incl. SCOPUS quoted, on the issues related to the implemented study courses. All faculty members have obtained certificates of competency for CAD software taught to students.

Professor **Modris Dobelis** has nearly 2.5 years of practical experience at Westinghouse Electric Corp. (USA) in the development of AP600 nuclear power plant project as a trainee/CAD engineer, practicing 3D modelling of piping systems and equipment, isometric schemes and drawings. As a Fulbright Teaching/Research Fellow, **Modris Dobelis** has organised and led an international education and research project on the development of a quantitative assessment method for engineering graphics literacy with academic staff from 5 technical universities in 4 countries and hands-on involvement of about 100 students in the research. He has supervised two Master Theses on BIM related topics, and has been the supervisor of a six-month post-doc study and research project for *tenure track* candidate Silvia Titotto from the Federal University of ABC, Brazil. **M. Dobelis** is a Corporate Researcher at the Graphics Literacy Education and Research Centre of the Faculty of Engineering of Kobe University, Japan, which organizes international collaborations in the field of engineering graphics, is an editorial board member of SciELO: Brazilian Archives of Biology and Technology Instituto de Tecnologia do Paraná - Tecpar, Brazil, is an article reviewer for "The Journal Biuletyn of Polish Society for Geometry and Engineering", Poland, and "Engineering Review" University of Rijeka, Croatia. **M. Dobelis** is a member of several international societies, e.g., Honorary Member of Alpha Pi Chapter North Carolina State University, the Board of Directors of Epsilon Pi Tau of the International Honor Society for Professions in Technology. He has participated in ERASMUS mobility activities at three Serbian universities and the University of Moratuwa, Sri Lanka. He holds a certificate in English at C1 level. He has obtained an international Certified SolidWorks Associate (CSWA) level certificate for the CAD software taught in the course. **Modris Dobelis** regularly lectures to foreign students of RTU Summer School in Robotics. During the last six years he has participated in 6 conferences and published 16 scientific articles on the issues related to the delivered study courses.

Assistant Professor **Zoja Veide** has participated as a researcher in the international mobility programme "Development of Cooperation between Baltic Universities and Kobe University in the Field of Graphic Sciences" (funded by the Ministry of Education of Japan), as well as in the ERASMUS+ projects "Development of Interactive and Animated Drawing Learning Tools" and "Modern Method for Spatial Awareness with Augmented Reality Technology" (Senior Expert, Scientific Supervisor). In the last six years, she has participated in 18 conferences and published 6 scientific articles on the issues related to the delivered study courses.

Lecturer **Veronika Stroževa** has worked as a researcher on the implementation of augmented reality in teaching. She has participated in ERASMUS+ projects "Development of interactive and animated drawing teaching aids" and "Modern method for spatial awareness development using augmented reality technology". Within the project, she gave a public lecture "Educational Applications of Augmented Reality", as well as organised an online lecture "Online Lecture from Japan to Latvia" for students of Engineering High School of Riga Technical University and Riga Secondary School No. 40. In the last six years, she has participated in 11 conferences and published 6 scientific articles. She has a certificate of the right to perform pedagogical activity.

The Department of Civil Engineering unites **11** academic staff members, **1** associate professor, **4** assistant professors, **3** lecturers, **1** assistant and **2** research assistants. Academic staff regularly improve their professional and academic knowledge at methodological seminars, conferences (national and international), scientific and research work, as well as by participating in various projects.

Lecturer **Raivo Kalderauskis** received the award “Young RTU Academic Staff of the Year 2019”, “Faculty of Civil Engineering Academic Staff of the year 2020” and was recognized in the journal “Forbes 30 under 30, Latvia” for achievements in higher education within Civil Engineering Education Initiative Group (CEEI).

In 2020, DCE established the “Building Digitalization Centre” (BDC) headed by **Kristaps Ritvars Ronis** as its director. In the course of its activities, BDC organized free study courses “Building Information Technologies”, which contributed to establishment of cooperation with “Latvijas standarts” and “CMB Inženieru kompetences centrs”. Over 250 Latvian specialists in civil engineering received training within these courses. The courses consisted of three training modules: BIM modelling, BIM coordination and BIM information management.

In November 2020, the members of the Department of Civil Engineering, together with participants from Lithuania, Estonia and Finland, launched the project Virstem - Virtual Technology for Use in STEM, initiated by Tallinn Technical University (Tallinna Tehnikakõrgkool). The aim of the project is to develop an interactive Engineering Graphics course within two years, which will be freely accessible to all civil engineering students.

In the framework of the conference “Digitisation in Construction”, faculty members of the Department of Civil Engineering **Kārlis Kostjukovs**, **Kristaps Ritvars Ronis** and **Raivo Kalderauskis** organised a "Digital Construction Education Day" to explore the current situation at Latvian higher education institutions to support and promote digitisation in construction. The main guest was Professor Lamine Mahdjoubi from the University of the West of England, who has established a Master's degree programme in BIM at his university.

Kārlis Kostjukovs, the Head of the Department of Civil Engineering, participated in exchange with the University of the West of England to gain knowledge about the implementation of Building Information Modelling (BIM) in the UK and its integration into the university environment. Kārlis Kostjukovs has been recognised as FCE Faculty Member of the Year 2018 and FCE Active Faculty Member of the Year 2018.

Associate professor **Māris Krievāns** authored various scientific articles, indexed in Web of Science and/or Scopus databases.

In 2020, assistant professor **Sandijs Mešķis** reported at “The 3rd International Conference of Continental Ichnology”, Germany, with the presentation titled “Three-dimensional methodology for photogrammetric reconstruction of ichnofossils”. He also authored a scientific article “Ichnofossil assemblages from the Pļaviņas Regional Stage, western part of the Main Devonian Field”.

At **the Department of Construction Production, 8** academic staff members are involved in the implementation of the study courses, including **2** professors, **2** associate professor, **2** assistant professors, **1** senior researcher and **1** researcher.

Professor **Mārtiņš Vilnītis** is actively involved in the work of the Latvian Association of Civil Engineers as the Head of the Education Section and also a member of the Board since 2015. In 2018 and 2019, he organised an international summer school "Sustainable Construction" in Riga and in 2020 he participated in the organisation of the 1st International Symposium on Sustainable Construction. From 14 January to 29 May 2020, Professor Vilnītis acquired new skills at professional development courses organised by CMB Engineering Competence Centre Ltd. During the training, he acquired knowledge on fire safety solutions for buildings, building management systems, building physics, modern technologies for various construction works, energy efficiency requirements, LVS standards, technical inspection and building supervision.

Professor **Viktors Mironovs** is the author and co-author of 12 scientific monographs, more than 300 scientific articles, 30 teaching and learning aids, several scientific and technical dictionaries and the holder of more than 30 Latvian patents. Professor Mironovs still participates in research work and in 2019 he published 10 scientific articles, indexed in Scopus database. Professor is the Head of RTU Research Laboratory of Powder Materials and is supervising 7 PhD Theses.

Assistant professor **Sanita Rubene** can reconcile her work as a building inspector at “Fabrum” Ltd. with the work of FCE lecturer, as a result, students obtain up-to-date and practice-based knowledge.

Leading researcher **Videvuds Ārijs Lapsa** has obtained confirmation for registration of 5 patents over the past 3 years - “The Fastening Construction for Windows in the Aperture of Heat Insulated External Wall and its Assembling Methods”, “Prefabricated Vault Construction and its Installation Process”, “Composite Fibre and pts Production Process”, “Civil Construction with External Prestressing” and “Suspended Staircase Structure”.

Associate professor **Vitālijs Lūsis** also received a *PostDoc* grant.

In 2021, with the support of the ESF project "Strengthening of academic personnel of higher education institutions in strategic specialisation areas ", FCE have recruited a visiting professor from the University of Salerno, **Michele Guida**, who has developed and is delivering the lecture course on "Radon Assessment and Management for Civil Engineering" specifically for FCE students.

Associate Professor **Baiba Gaujēna** has co-authored 19 scientific publications, participated in several scientific and international conferences, is the Head of the study programme "Civil Engineering", as well as is the member of the State Examination Committee for the Graduate Papers of the Faculty of Civil Engineering of RTU. She is a supervisor of graduate papers for students of different levels - Master's and Bachelor's with engineering project part. In 2018, she received the FCE Student Recognition Award "Student Support 2018".

At **the Department of Composite Materials and Structures,** there are 4 academic staff members, **2** professors, **1** assistant professor and **1** lecturer.

For example, Professors **Andris Čate** and **Jevgenijs Barkanovs** are Corresponding Members of the Latvian Academy of Sciences and actively participate in the work of the Department of Physical and Technical Sciences.

Professor **Andris Čate** is the author of more than 100 scientific publications in the fields of composite materials, digital mechanics and optimization (Hirsch citing index - 18), and the Editor in Chief of the international scientific journal “Mechanics of Composite Materials”. He has led various national projects (Latvian Academy of Science, State Research Programme), as well as has been the RTU leader in many international projects (EU framework programme). “Scientist of the Year 2014” at Riga Technical University.

Professor **Jevgenijs Barkanovs** has participated in more than 30 international conferences and published 70 scientific articles (Hirsch citation index - 13). He is a member of the editorial boards of several international scientific journals and has lectured as a visiting professor at universities in both European and Asian countries. Professor Evgeny Barkanov has led several national projects (ERDF, ESF) as well as international projects (EU Framework Programme). He has received several RTU awards for outstanding achievements in science, teaching and organisational work.

Assistant professor **Pāvels Akišins** has participated in various national and international scientific research projects, and is the author of more than 20 scientific publications. In the framework of *Erasmus+* mobility programme, he delivered lectures at TU Dresden.

Lecturer **Andrejs Kovaļovs** has a more than 20-year experience in the national and international scientific research projects. He participated in 20 international conferences, published 40 scientific articles, and is the author of one patent. In the framework of *Erasmus+* mobility programme, he delivered lectures at TU Dresden.

At **the Department of Building Materials and Building Products, 11** academic staff members

are involved in the implementation of study courses, including **2** professors, **1** associate professor, **4** assistant professors, **1** senior researcher and **1** researcher.

For example, Professor **Diāna Bajāre** is currently leading 3 research projects (2 national and one international) on the development of innovative construction materials and, in collaboration with SIA Sakret, she is developing 3D concrete printing technologies. She has participated in two international study/ teaching material development projects (H20H20, Erasmus +); participates in several international networking events and projects. In the last 5 years, she has presented papers at more than 10 conferences and published more than 45 scientific articles cited in Scopus database (H-index 16). She is currently a guest editor for several scientific journals and reviews about 10 scientific articles per year. At the same time, she supervises PhD Theses and peer-reviewed dissertations both in Latvia and abroad.

Professor **Aleksandrs Korjakins** received the honorary title "RTU Scientist of the Year 2019", certificates of recognition for many years of qualified training of young specialists and scientific work, a certificate for mastering the English language programme and B1 (intermediate) level compliance, and has regularly participated in seminars and advanced training courses. He has participated in 7 COST projects, as well as national and international projects such as ERDF, LCS and ESF funded projects, published a total of 10 patents and more than 180 scientific articles, of which 88 are indexed in SCOPUS and/or Web of Science, with a current h-index of 16. He has participated in more than 50 scientific conferences and in the Erasmus+ international mobility programme, with exchange visits to Vilnius Gediminas Technical University, Lithuania, University of Malta, Malta, University of Structural Engineering & Architecture (VSU) "Lyuben Karavelov, Bulgaria.

Associate Professor **Genādijs Šahmeko** has received a Certificate of Appreciation for many years of qualified training of young specialists and scientific work, a Certificate of English language programme and B2 (intermediate) level compliance, has regularly participated in seminars and advanced training courses. He has published a total of 8 patents and more than 100 scientific articles, including more than 20 scientific articles indexed in Web of Science and/or Scopus databases in the last 3 years. He has participated in more than 40 scientific conferences and in Erasmus+ international mobility programme, with exchange visits to Vilnius Gediminas Technical University, Technical University of Dresden, Tallinn Technical University. (He has organised conferences of the Latvian Concrete Union and represents RTU on the Board of the Concrete Union).

Assistant professor **Ģirts Būmanis** was awarded the title of RTU Young Researcher of the Year 2021, participated at more than 10 conferences and published 43 scientific articles indexed in SCOPUS database and his current h-index 9 with 305 citings. Ģ. Būmanis received a PostDoc grant from 2018 to 2020. Currently, he and participates in the national and international projects, such as ERDF, LCS and ESF projects. Ģ. Būmanis participated in international scientific partnership projects, such as COST action, conducted research in research institutes of Estonia, Lithuania, Portugal and Slovenia. Ģ. Būmanis holed a certificate of the building inspector, as well as possesses good experience in lecturing and supervision of student papers. He has been a supervisor of two Bachelor Papers, one Master Thesis and one international Master Thesis. Currently he is a scientific supervisor of one PhD Thesis. His research interests are related to alternative binding substances, alkali activated materials, plasters, waste recycling, biocomposites and high-strength concrete.

Assistant professor **Māris Šinka** was awarded the title of RTU Young Scientist of the Year 2019, took part in more than 10 international conferences and published 30 scientific articles including 16 indexed in SCOPUS database. His current h-index is 6 with 102 citings, he is the author of two Latvian patents. M. Šinka received a PostDoc grant for 2020-2022, as well as took part in the National Research Programme and ERDF research projects. M. Šinka conducted research at Ghent University, Belgium, established and manages a 3D concrete printing laboratory.

The above information on each of the faculty academic staff, as well as the faculty academic staffs' biographies, demonstrate their high level of qualification and their ability to ensure the quality of the stage courses and the quality of the programme as a whole. Many of the lecturers are also active in the construction industry, which also helps to translate their practical knowledge and competences into achieving the objectives of the programme. The programme's academic staff contribute to the achievement of the learning outcomes through their qualifications and their knowledge and skills.

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

16 professors – Doctors of Science, whose scientific and academic qualifications corresponds to the regulations on the criteria for the election in the professor position, are involved in the implementation of the study programme.

7 elected associate professors – Doctors of Science, whose scientific and academic qualifications corresponds to the regulations on the criteria for the election in the position of an associate professor, are involved in the implementation of the study programme.

Furthermore, 11 assistant professors, 7 lecturers, 3 leading researchers, 1 researcher and 1 assistant are involved in the implementation of the study programme.

During the reporting period, the changes were insignificant, although 5 members of the academic staff were involved additionally in the programme implementation. Analysis showed that this happened for a variety of reasons:

1. The associate professors and assistant professors advanced their qualifications over the reporting period and became professors or associate professors, respectively;
2. The academic staff took part in grant competitions, and received funds and opportunities to conduct the research in the field, thus changing their academic position to a leading researcher position;
3. New industry specialists were recruited to promote introduction of advanced technologies in the study courses; thus, lecturers and assistants came to work in the programme.
4. Retirement;
5. Termination of employment due to commencing work in the construction sector that offers a significantly higher salary.

The overall changes during the reporting are given in the table:

Academic position	Academic year 2016/17	Academic year 2020/21
Professor	16	16
Associate professor	9	7
Assistant professor	13	11
Lecturer	0	7

Leading researcher	2	3
Researcher	0	1
Assistant	0	1

The table shows that the programme involves new qualified members of the academic staff, thus maximally adjusting the programme curriculum to the specifics and latest development in the sector.

Within the Faculty, targeted measures are taken to ensure that changes in the composition of the teaching staff have a positive impact on the development and quality of the study programme, as well as compliance with the requirements set out in the regulatory enactments. Changes in the content of the study programme and the addition of new study courses to the programme, which are more in line with the development of the field, have also successfully influenced the achievement of the programme objectives and the acquisition of new study courses.

Currently, RTU is implementing SAM 8.2.2 project on "Strengthening of Academic Personnel of Riga Technical University in Strategic Specialisation Areas" financed by the European Social Fund, one of the tasks of which is the renewal of academic personnel. The aim of the project is to strengthen RTU academic personnel in the areas of strategic specialisation in 10 study fields, including the study field "Architecture and Civil Engineering". The project activities are focused on three areas:

- Involvement of Doctoral students in the work of the academic staff at RTU,
- Involvement of foreign academic staff in the work of the academic staff at RTU,
- Improvement of the existing academic staff qualifications, including academic staff internship at an economic operator.

Within the project, academic staff have an opportunity to develop their competence at the courses in professional English, as well as specialized training courses.

In order to ensure and increase the impact of scientific activities and personnel development, RTU management signs an annual agreement with each RTU faculty, which sets specific quantitative indicators in the areas of studies, scientific activities and valorisation.

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

3.4.4. Information on the participation of the academic staff, involved in the

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

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

In the process of study programme implementation, close cooperation of academic staff takes place, which is also manifested in the following activities:

- Discussion of the results and quality of the reviews at the department meeting, discussing the evaluation criteria and ways to improve the quality of the graduate papers.
- Interconnection of lectures and practical classes, discussion of strengths and weaknesses afterwards.
- Joint attendance of methodological seminars, which are held in an interactive way, where academic staff share their experience and discuss the latest scientific and professional trends, as well as psychological and pedagogical techniques and methods for improving the study process.
- Cooperation within the projects, where the experience gained is used by the academic staff in the study process.
- Joint study tours, where academic staff and students learn about current developments in the field and apply practical case studies in classroom sessions.

The student-faculty ratio at the study programme at the time of submission of the self-evaluation report is 685/46 or one member of the academic staff to 15 students.

Annexes

III - Description of the Study Programme - 3.1. Indicators Describing the Study Programme		
Sample of the diploma and its supplement to be issued for completing the study programme	RBCB0.zip	RBCB0.zip
For academic study programmes - Opinion of the Council of Higher Education in accordance with Section 55, Paragraph two of the Law on Higher Education Institutions (if applicable)		
Compliance of the joint study programme with the provisions of the Law on Higher Education Institutions (table) (if applicable)		
Statistics on the students in the reporting period	Annex 5.pdf	5. pielikums.pdf
III - Description of the Study Programme - 3.2. The Content of Studies and Implementation Thereof		
Compliance with the study programme with the State Education Standard	Annex 6.pdf	6. pielikums.pdf
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard or the requirements for professional qualification (if applicable)	Annex 7.pdf	7. pielikums.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.pdf	8. pielikums.pdf
The curriculum of the study programme (for each type and form of the implementation of the study programme)	Annex 9.zip	9. pielikums.zip
Descriptions of the study courses/ modules	RBCB0_EN.zip	RBCB0_LV.zip
Description of the organisation of the internship of the students (if applicable)	Internship_Management_Procedure.pdf	Prakses_organizesanas_kartiba.pdf
III - Description of the Study Programme - 3.4. Teaching Staff		
Confirmation that the academic staff of the doctoral study programme includes not less than five doctors, of which at least three are experts approved by the Latvian Council of Science in the branch or sub-branch of science in which the study programme intends to award a scientific degree (if applicable)		
Confirmation that the academic staff of the academic study programme complies with the requirements specified in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions (if applicable)		

Architecture (51581)

Study field	*Architecture and Construction*
ProcedureStudyProgram.Name	*Architecture*
Education classification code	*51581*
Type of the study programme	*Doctoral study programme*
Name of the study programme director	*Uģis*
Surname of the study programme director	*Bratuškins*
E-mail of the study programme director	*ugis.bratuskins@rtu.lv*
Title of the study programme director	*Dr. arch*
Phone of the study programme director	
Goal of the study programme	*Doctoral studies are intended to complement knowledge, skills and abilities gained in the previous level studies to independant research work in architecture and urbanism, as well as to prepare for independent research and teaching activities*
Tasks of the study programme	** to develop understanding of the process of interaction and relationship environment in art and related fields; * to develop the ability to identify the problem, describe its relevance and relationship to other sciences and arts sectors; * to develop the ability of independent research work; * to perform research and complex experiments; * to develop independently study courses and conduct classes at any level programs.*
Results of the study programme	** manages the principles of research work; * is able independantly to publish the research results; * is able to manage the work of researchers; * is capable to develop and supervise study programmes.*
Final examination upon the completion of the study programme	*Doctoral Thesis*

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 degree in engineering science of architecture, or comparable education*

Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Doctor of Science (Ph.D.) in Music, Visual Arts and Architecture*
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 - 4 years - english

Study type and form	*Full time studies*
Duration in full years	*4*
Duration in month	*0*
Language	*english*
Amount (CP)	*192*
Admission requirements (in English)	*Master degree in the engineering science of architecture, or comparable education, level of English language proficiency at least B2.*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Doctor of Science (Ph.D.) in Music, Visual Arts and Architecture*
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

3.1. Indicators Describing the Study Programme

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

During the reporting period, no changes to the parameters of the PhD study program “Architecture” have been made.
The program structure offers an opportunity to plan study courses and scientific research according to the area and specifics of each field of research. After viva voce of the PhD theses, graduates of the study program are awarded a Doctoral degree (Dr. arch., since 2018 – PhD) in the field of humanities and artistic sciences “Music, Visual Art and Architecture”. The volume of the study program is 192 CP or 288 ECTS, and the nominal duration of full-time studies is 4 years. The study program is implemented in Riga in the Latvian and English languages.

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

The PhD study program “Architecture” covers research in all fields of architecture related to the consequences of sustainable development of the public living environment. The goal of the study program is to advance the knowledge and skills of students necessary for the research in the fields related to the art of environment design, as well as to prepare them for individual research work. PhD studies can be started by people with architect’s qualification who completed the Master study program in architecture or a similar field of education.

After viva voce of the PhD theses, graduates of the study program are awarded a Doctoral degree (before 2018 - Dr. arch., since 2018 – PhD) in the field of humanities and artistic sciences “Music, Visual Art and Architecture”. The volume of the study program is 192 CP or 288 ECTS, and the nominal duration of full-time studies is 4 years. The study program is implemented in Riga in the Latvian and English languages.

The study program is implemented according to the Law on Higher Education Institutions (02.11.1995), the Law on Scientific Activity (19.05.2005.), the Law on Education (29.10.1998.), the Cabinet Regulations No. 1001 “The procedure and criteria for the awarding of a PhD degree” (27.12.2005.), RTU Constitution, RTU Senate decisions and RTU regulation on doctoral studies. The study program is implemented with regard to the fields of RTU research, as well as the latest developments in environment design in Latvia, Europe and worldwide. It is oriented at education

and training of the next generation of academic staff members and researchers according to the Cabinet Regulation No. 331 “Education Development Guidelines 2014–2020”, as well as to other national and international regulations.

Programme code 51581 complies with Cabinet of Ministers Regulation No 322 Latvian Classification of Education. The first and second levels of classification, represented by the first two digits of code 51 is doctoral studies (doctoral degree), to be implemented after obtaining a master's or professional master's degree.

The third, fourth and fifth levels of classification (thematic groups, subject areas and programme groups), denoted by the next three digits 581, are Architecture and urban planning (58 stands for Architecture and Civil Engineering).

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

The economic and social substantiation of the study programs is based on performed industry surveys, which are regularly performed on annual basis by the Ministry of Economics, and it is aimed at following up the development trends of the architecture and civil engineering field, including fluctuations in the increase of the construction and the indices of increase of the construction costs, in order to identify factors hindering development of the industry and eventual overheating risks in a timely manner, as well as forecasting the production scope and costs in the next years by applying forecasting methods. The survey reveals that during the whole period from 2020 to 2024 the experts and combined forecasts predict further increase of the industry costs. During the period from 2020 to 2022 this increase could be estimated within the a range of 1% to 5% per year, and in 2024 it could achieve 6%. According to the forecast the biggest increase of costs relates to labour costs where the combined forecast predicts a general increase of 8% to 10% per year over the period from 2020 to 2024. As regards sub-fields, in 2020 a decrease of the industry costs is predicted in the construction of residential and non-residential buildings, as well as in the construction of roads and highways. The most rapid increase is predicted in the construction of bridges and tunnels. An increase of costs in all the sub-fields is forecasted as from 2022 by the construction of bridges and tunnels leading with an annual increase of 5-7%.

The industry researchers have concluded that also defects and deficiencies in construction design documents and insufficient scope of preliminary studies present risks of increase of prices on the level of individual sites in the industry of architecture and civil engineering. In order to mitigate this risk, it is important to implement the building information modeling (BIM) system in Latvia as soon as possible, as it can considerably improve the quality of construction design documents, contribute to predictability of construction, optimise organisation of construction works and their sequential performance, reduce construction terms and improve efficiency of project management and supervision.

The architecture and civil engineering industry has experienced very fast development as from 2017. Its growth amounted to 19.4% in 2017 and to 21.9% in 2018; construction volumes increased in all the core groups of construction during the last year. Both availability of the EU funding and private investment encourage the industry growth. Attraction of employees in the industry has restarted since 2018, the number of employees was 74.6 thousand last year accounting for 30% increase compared to 2010, however, the pace of the growth was lagging behind that of the production growth. The wages of employees have increased considerably in the industry during the

last two years and last year they amounted to 94.6% of the mean wage in the national economy.

There are 3 study programs within the sub-direction "**Architecture**", the academic Bachelor, Master and Doctoral program. The Bachelor and Master programs jointly provide designing skills and other theory and practical knowledge in related industries to students. The majority of graduates of the study direction work in regulated fields in the Republic of Latvia where the independent practice certificate can only be obtained by the persons possessing the professional Master level education.

The architect's education has been provided by RTU since 1869 and it has undergone substantial development and improvement, at the same time maintaining the local tradition and character, which can be observed best in the constructed environment. In Latvia the architect's education can also be acquired at the Business, Art and Technology University RISEBA in the Bachelor and Master study programs, and the education of the landscape architect is offered by the University of Agriculture of Latvia. In comparison to the architecture study programs of universities of other European countries, the architect's education at RTU is characterised by long-standing tradition and high quality, by ensuring succession of knowledge and experience, which is based on the balanced academic environment and staff to a large extent. In the Bachelor program students acquire the basic knowledge of architecture in Latvian. In comparison to other architecture study programs available in Latvia and abroad, the academic staff of the architecture program at RTU provide the set of theory and practical knowledge which is recognised in Europe and most appropriate for the Latvian situation.

Graduates of the study program are employed in the field or continue their scientific work.

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

During the reporting period, the study program featured stable numbers of students and enrolled candidates. Every year 9 PhD students on average study at the PhD study program in Latvina. There are currently no students admitted to the English language stream. The largest number of students at the study program was 11, but last year the number of students decreased to 6. This change is connected with the decision of many PhD students to take a sabbatical leave or to withdraw from PhD studies, reasoning it by inability to combine their work in the industry and studies.
Every year 1 or 2 students on average are enrolled and in accordance with the number of state-funded seats the candidates selected in the scholarship contest have an opportunity to receive the state scholarship. Every year 4-5 candidates express their interest in PhD studies. During the reporting period, PhD students chose full-time studies and were not matriculated to part-time studies.
Analysis of the student number dynamics in relation to the trends in the sector shows that in the future the study program might have the number of students corresponding to the pace of the country's development.

3.1.5. Substantiation of the development of the joint study programme and description

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

3.2. The Content of Studies and Implementation Thereof

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

The goals of the study courses are harmonized with the program goal – to advance the knowledge and skills of students necessary for research in the fields related to the art of environment design. For example, the goal of the study courses is to give knowledge and capacity to master the latest developments in scientific research and aesthetics of professional activities, as well as to raise awareness about research methodology and strategies in cross-disciplinary research of environment design.
PhD studies comprise four-year full-time studies and five-year part-time studies, and can be started by people with architect's qualification who completed the Master study program in architecture or similar field of education.

The academic staff of architectural programs is involved in a variety of **research fields**:

- History of architecture in Latvia and urban planning in European cultural context (correlation of local architectural specifics to global trends, for example, the use of a traditional local material – timber – in modern architecture);
- "Discordant" heritage in Latvia (abandoned Soviet military sites, etc.);
- Perspectives of large-scale development of neighborhoods (large-scale neighborhoods take a significant share in the residential stock of Latvian towns, which makes their future perspectives a relevant research issue);
- Quality of residential houses in historical centers (a crucial issue due to the vast historical heritage and urgent need for preservation of dwelling functions in city centers, especially in Riga historical center);
- Identity and balanced development of urban environment (how to balance global development trends and needs for local heritage preservation, ensuring contemporary urban development, while preserving the local identity);
- Contemporary trends of urban horticulture (allotment gardens represent a traditional part of the Latvian cities, and their further role in urban renovation is to be evaluated in the context of regional and global processes);
- Urban development in flood prone areas (despite various threats and regulatory limitations,

people wish to raise buildings in flood prone areas, which makes it necessary to create a research-based system for development of such territories).

Research outcomes of the academic staff and students and their involvement in implementation of the study programs at other study levels offer an opportunity to update study courses and add research aspects and volumes in architecture in all study programs. For example, PhD students take part both in implementation of the study courses and supervision and reviewing of the Bachelor and Master theses.

Achievable results of the study program - to manage the principles of scientific activity; be able to independently publish research results; to be able to supervise the work of researchers and to be able to perform pedagogical work and manage study fields are related both to several study courses - for example “Architectural Ethics and Methodology of Scientific Work” and “Public Interpretation of Theoretical Findings” and to supervising and reviewing lower level students' work.

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

After viva voce of the PhD theses, graduates of the study program are awarded a Doctoral degree (Dr. arch., since 2018 – PhD) in the field of humanities and artistic sciences “Music, Visual Art and Architecture”.

The academic staff of architectural programs is involved in a variety of **research fields**:

- History of architecture in Latvia and urban planning in European cultural context (correlation of local architectural specifics to global trends, for example, the use of a traditional local material – timber – in modern architecture);
- “Discordant” heritage in Latvia (abandoned Soviet military sites, etc.);
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- Contemporary trends of urban horticulture (allotment gardens represent a traditional part of the Latvian cities, and their further role in urban renovation is to be evaluated in the context of regional and global processes);
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Research outcomes of the academic staff and students and their involvement in implementation of the study programs at other study levels offer an opportunity to update study courses and add

research aspects and volumes in architecture in all study programs. For example, PhD students take part both in implementation of the study courses and supervision and reviewing of the Bachelor and Master theses.

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

The study courses of the study program are oriented at effective application of the latest scientific and artistic knowledge in the PhD theses. The integrated dimension of theoretical and practical classes is based on individual work, when each student develops an individual theoretical paper (report, research, etc.) within the topic of their research or summarize the study project results.

Learning outcomes are registered in the digital database of RTU Study Department.

Supervision of the term papers and theses is provided individually. It ensures comprehensive training related to specifics of the PhD thesis, covering both the context of a topic and student's interests.

Qualifications of the academic staff at the study program meets the program requirements. The program involves only internationally renowned scientists in the field with the appropriate research outcomes.

Doctoral studies are planned for 4 years, divided into 8 study semesters. The duration of full-time studies is 4 years (48 weeks x 4 = 192 weeks). The amount of studies in doctoral studies is 192 CP (1 CP / week x 192 weeks). The volume of the study program and the total duration of studies are the same for students with different previously acquired education: 192 CP - for full-time studies.

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

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

The promotion procedure is determined by the Regulations on Promotion Councils and Promotion at RTU. The promotion at RTU is allowed for the scientific domains, which are accredited for Doctoral study programmes in accordance with the Regulations of the Cabinet of Ministers No. 1000. At present, 19 Promotion Councils operate at RTU being entitled to confer a scientific degree in architecture, civil engineering, electronics and telecommunications, electrical engineering, power engineering, information technologies, chemistry, chemical engineering, mechanical engineering, materials science, mechanics, transport and communication, management and environmental science.

The Promotion Councils confer the PhD degree for an independently developed and publicly defended promotion work under the supervision of an experienced scientist (a professor, an associate professor, an assistant professor and/or the leading researcher, who is approved in accordance with the procedure determined at RTU).

The promotion work may be a Doctoral Thesis, or a thematically united series of scientific publications, or a monograph – a refereed scientific book, which is dedicated to one subject.

For a PhD student, qualitative Doctoral Studies are completed with passing of all examinations and tests anticipated by the Doctoral Studies work plan, submission of the promotion work for defence of the PhD degree at the Promotion Council of the corresponding industry, public defence of the promotion work and obtaining the PhD degree.

The first stage on the way to obtaining the PhD degree is completed when a PhD student successfully passes all examinations and tests anticipated by the Doctoral Studies work plan, as well as develops his/her promotion work.

The second stage is submission of the promotion work to the Promotion Council of the corresponding industry for public defence. A structural unit of RTU, where the promotion work is developed, makes a decision at a meeting that the promotion work has been developed and is to be submitted to the Promotion Council of the corresponding industry. A candidate for the scientific degree submits an excerpt from the meeting proceedings together with other required documents (in accordance with the Regulations on Promotion Councils and Promotion at RTU) to the Promotion Council of the corresponding industry.

At **the third stage** the Promotion Council accepts the promotion work, when its author substantiates his/her choice of the subject, defines the goal and objectives of his/her research, characterises scientific achievements during the research of the subject and the used methods, reports on and discusses the results obtained in the work and conclusions, summarising these in the conclusions and the theses to be defended.

Not later than two weeks prior to the promotion work defence date determined by the Promotion Council, the PhD candidate, who has been already dismissed from the Doctoral Studies due to completion of the theoretical course, submits an application addressed to RTU Vice-Rector for Research for his/her reinstatement at Doctoral Studies to the Doctoral Studies Department; Places the promotion work, its summary (in Latvian and English) and the promotion work appendices in the electronic form on the ORTUS portal; Submits one copy of the promotion work and its summary (in Latvian and English) to the RTU library; Submits two copies of the promotion work and seven copies of its summary (in Latvian and English) to the National Library of Latvia.

Notices on submission of the promotion work and its summary to the libraries must be submitted to the Promotion Council Secretary prior to the defence.

The fourth stage is defence of the promotion work. The Regulations on Promotion Councils and Promotion at RTU provide information regarding the process of public defence of a promotion work and conferring the scientific degree.

The PhD degree is conferred to the candidate pursuant to the resolution of the Promotion Council, with the order of RTU Rector.

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

Topics of student research and theses added to the PhD study program are chosen referring to the latest developments in the industry and global trends having an impact on the development of national and European policies and practices in Latvia. The topics are very diverse and cover a wide range of research areas and both national and international research.

During the reporting period, nine topical theses in architecture have been publicly presented. The PhD student Edgars Bondars defended the thesis “Spatial Environment Design in the Context of Bioclimatic Factors” (supervisor – Prof. S. Treija); Agate Eniņa – “Architecture of Buildings of the Arts in Latvia” (supervisor – Prof. J. Krastiņš); Ilze Rukmane-Poča – “The Synthesis of Arts in Latvian Architecture” (supervisor – Prof. J. Krastiņš); Ilze Paklone – “Visual Representation in Spatial Planning in Latvia” (supervisor – Prof. I. Strautmanis, advisor – Prof. J. Krastiņš); Linda Leitāne-Šmīdberga – “Architectural Competitions in Latvia” (supervisor Prof. J. Krastiņš 27.06.2019.); Ilze Miķelsone – “Value System in Architectural Practice” (supervisor – Prof. S. Treija 30.10.2019.) and Antra Viļuma – “Wooden Structures in Latvian Architecture” (supervisor – Prof. U. Bratuškins 29.12.2020.).

Publicly presented theses are reviewed and evaluated for compliance to the research topic and relevance to the requirements of the field of science and for the presence of innovative results in the related field./.

3.3. Resources and Provision of the Study Programme

3.3.1. Assessment of the compliance of the resources and provision (study provision, scientific support (if applicable), informative provision (including libraries), material and technical provision, and financial provision) with the conditions for the implementation of the study programme and the learning outcomes to be achieved by providing the respective examples.

In order to implement the study program and to achieve the learning outcomes both the physical infrastructure, and academic and research facilities are evaluated and supplemented on the annual basis, including printed and digital publications. To ensure as high learning outcomes as possible, for the period of active studies each student is provided with a constant work place in the design

workshop. It is equipped with all furniture and equipment necessary for architectural work, including the necessary utility connections. According to the volume of the program funding, resource and software renewal and upgrade is performed regularly.

In order to update the contents of the course literature, the academic staff of the faculty develops and updates regularly the learning aids (for development of certain courses and laboratory works). Students have RTU and AF data storages at their disposal:

- RTU Scientific Library repository of books and periodicals,
- Resources of the construction branch of RTU Scientific Library,
- Resource room with wide and relevant range of learning and specialized literature, regularly updated,
- Archive of learning aids – project design office.

Information repository funds are updated and renewed regularly with top scientific and professional journals or periodicals and books in the field.

The Faculty of Architecture also has its own library and resource room with new and historic books on architecture and architectural drawings, available in the faculty building. It stocks over 30,000 publications, including books, periodicals, landmark and unique folios, maps, architectural drawings, etc. It also stores student graduation papers, and their digitalized archive.

Scientific and artistic innovation events are financed from RTU Scientific Development Fund. For instance, the international conference “Koka dienas” (2017 –2019), Forum Wood Building Baltic and other events attended by students. Within these events, researchers and students have an opportunity to acquire new knowledge, share their experience and establish contacts in a view of new research and artistic innovation projects.

More detailed information is given in Criteria 2.3.1.- 2.3.3. of Section 3 of Part II.

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

Due to a relatively small number of PhD students, the issue of study and research work experience extension is important. Similar issue is observed in the neighbor countries – Estonia and Lithuania. To promote extension of work space for PhD students, AF together with Vilnius Gediminas Technical University, Vilnius Academy of Arts, Kaunas University of Technology, Estonian Academy of Arts and Tallinn University of Technology has been organizing joint activities for PhD students for several years – seminars, conferences, etc., making possible both to share knowledge about research specifics in the framework of research of different national cultural heritage and to lay foundations for joint research. From time to time, similar trends are also observed in research in the Scandinavian countries, and, based on close academic contacts between the Baltic states and Nordic higher schools, activities of each school reach other schools at least as a new information.

Apart from regional contacts, through coordination of architectural education in the European Union (EAAE) AF also actively participates in the work of international research institutions (AESOP, DOCOMOMO etc.).

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

The source of funding for the study program is State funding is divided proportionally between payments and development expenses.
2017/2018 In the study year, the state funding was 64275 EUR. The cost per student within this study program was 14629 Eur.
2018/2019 in the study year the state funding was 57402 EUR. The cost per student within this study program was 15314 Eur.
2019/2020 study year state funding - 71953 EUR Costs per student within this study program were 15949 Eur.
2020/2021 in the study year state funding - 96737 EUR. The cost per student within this study program was 16158 Eur.

Information on the minimum number of students in RTU study programmes is provided in the appendix of the self-evaluation report "On minimal number of students in study programmes".

Information on the funding distribution between the cost items is provided in the appendix of the self-assessment report "Funding distribution between the cost items".

Funding for the development of the study program is used centrally for the renewal of the scientific library fund, improvement and maintenance of shared auditoriums, public relations, program marketing activities, development and maintenance of information systems related to the study process, development of Ķīpsala complex and other activities. In addition, the available funding is also used for raising the qualification of teachers and exchanging experience, as well as for motivating students.

Tuition fees are determined in accordance with the remarks of the State Audit Office that tuition fees for students studying together with budget students may not be less than the state funding for this service. State funding is not granted for part-time extramural studies, therefore tuition fees are determined taking into account several factors, for example, to enable the program to cover its costs, market situation, demand for the study program, stage of development of the study program, etc.

3.4. Teaching Staff

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

learning outcomes.

Overall evaluation of the academic staff is given in sub-sections 2.3.5.-2.3.6. of the Study Field Report, Part II, Section 3 and the CVs of the academic staff members. Hereinafter the accent is put on qualifications and competencies of the academic staff involved in the implementation of the study program with the reference to specifics of particular study courses.

The qualification of the academic staff involved in the study program fully meet the study program requirements and regulations, ensure achievement of the goals of the study program and corresponding study courses and learning outcomes (see the CVs of the academic staff). The study program mainly involves full-time RTU elected academic staff members. Elected academic personnel are responsible for development of the study courses, curriculum design and improvement. Responsible instructors are the specialists with the corresponding research qualification.

Professor, Dr. arch. Jānis Krastiņš is an architect, Dr. habil. arch., Professor, Head of the Department of History and Theory of Architecture, Riga Technical University, member of the Latvian Association of Architects (1970), Full member of the Latvian Academy of Sciences (1994), President of the Latvian Academy of Regional Architecture (2019). Member of the editorial boards of many scientific editions, scientific councils and official advisory bodies, implemented a number of architectural projects and investigations of cultural monuments, the author of more than 710 scientific papers published in Austria, Belgium, Czechia, Denmark, Iceland, Italy, Estonia, Finland, France, Germany, Latvia, Lithuania, the Netherlands, Norway, Poland, Portugal, Russia, Slovenia, Spain, Sweden, Turkey, United Kingdom and the United States of America, including 30 books on various aspects of history and theory of architecture.

Professor, Dr. arch. Uģis Bratuškins is an architect and RTU Professor since 2012; Dean of the Faculty of Architecture since 2007. University lecturer at the study courses of Architectural Design, Interior Architecture, Morphology and Research of Architecture, Building Typology and others. Over 80 scientific publications. LCS expert in Music, Visual Art and Architecture, the branch of Humanities and Artistic Science, scientific expert at Slovenian Research Agency (since 2015) and Romualdo Delbjanko Foundation (Florence, Italy, since 2008). Vice-Rector of the Nordic Baltic Academy of Architecture (since 2013), Member of the editorial boards of scientific edition of Vilnius Gediminas Technical University “Journal of Architecture and Urbanism” and scientific edition of Kaunas Technology University “Journal of Sustainable Architecture and Civil Engineering” (Lithuania), and scientific edition of the Latvian Academy of Agriculture “Landscape Architecture and Art” and Riga Technical University scientific journal “Architecture and Urban Planning”, as well as a reviewer of MDPI (Switzerland) scientific journals “Sustainability” and “Energies”. He also works in the editorial board of the professional journal “Latvijas Arhitektūra” and as an external consultant of the popular science journals “Ilustrētā Zinātne” and “Ilustrētā Pasaules Vēsture”. Participant of the State Culture Capital Foundation (SCCF) Committee for Architecture and Design (2013–2015 and since 2020) and takes part in the work of the Council for Conservation and Development of Riga Historic Centre as an advisor. Member and member of the board of the Latvian Association of Architects (since 1989).

Professor Dr.arch. Sandra Treija is an architect and an RTU Professor. Doctor of Architecture (since 2006). Professional on-the-job experience as an architect-planner and project manager at Urban Planning Unit of the City Development Department of Riga City Council (1997-2001). Academic experience at RTU Faculty of Architecture in different academic positions (since 1998), from an assistant to a professor (since 2012), as well as in administrative positions – Vice-Dean for

Academic Affairs (2001-2006), Vice-Dean for Research (since 2007). Developed and lead 8 study courses on urban development and spatial environment related topics for the students in a variety of specialties. Member and member of the board of the Latvian Association of Architects. Expert at the Latvian Council of Science: the field of activity – Humanities and Social Sciences, Artistic sciences, including Architecture: architecture, urban planning, sustainable development, urban ecology, urban landscaping, living environment. Coordinator of Docomomo national group. S. Treija regularly speaks at international conferences, author and co-author of over 50 scientific publications. Member of the editorial boards of the scientific journals "Architecture and Urban Planning" (RTU) and "Landscape Architecture and Art" (LLU). Reviewer of MDPI (Switzerland) scientific journals "Sustainability" and "Energies".

Sandra Treija has supervised the development and viva voce of 3 PhD theses and currently 4 more PhD theses are being developed under S. Treija's scientific supervision. She has taken part in the international and national research projects, including the current ones – "Up-to-date Information Systems in Urban Regeneration", Latvia-Lithuania-Taiwan Scientific Foundation; "Technological Solutions for Energy Efficiency of Buildings", State Research Program; "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 concerned with sustainable urban development, housing problems, quality of living environment, urban regeneration issues.

Professional, academic and research activities provide a complex view of the current challenges in urban development, which in turn gives Professor the opportunity to address the latest theoretical and practical developments in the industry in the study process.

Assistant Professor, Dr. arch. Edgars Bondars is a member of the academic staff and a researcher at RTU Faculty of Architecture. Professional degree in architecture (2008), Master degree in Architecture (2009), Doctor of Architecture (2013) dealing with the topic "Spatial design in the context of bioclimatic factors". Fields of research: bioclimatic design, energy efficiency strategies in architectural design. As an assistant, researcher or manager has taken part in 12 research projects, author of 23 various publications, including those in scientific and professional journals. Co-founder and member of the board of the architectural bureau RR.ES (since 2006), dealing with residential, public, and industrial building design. As an assistant or project designer has taken part in the development of at least 40 small and middle-scale architectural projects and draft projects.

Assistant Professor, Dr. arch. Ilmārs Dirveiks is a member of the academic staff at RTU Faculty of Architecture, Department of History and Theory of Architecture. Worked as a lecturer and assistant professor at the professional study program (2004-2015), but since 2015 has been an assistant professor. Professional degree in Architecture (1983), Master of Arts and Humanities (2003), Doctor of Architecture with the thesis "The Window onto Latvian Architecture" (2010). Art conservator and senior master of artistic research in architecture (2018). Lecturer at the Art Academy of Latvia (since 2016). Lecturer in arts at Daugavpils University (2012-2018). Expert of the Scientific Council of the State Inspection for Protection of Cultural Monuments (2008-2020). Riga Castle renovation board member (since 1995). Lecturer at cultural awareness workshops on the issues of conservation and renovation of historical buildings (since 1983). Lecturer at the international workshops and conferences. Author of approximately 40 publications, including those in scientific and professional journals. Since 2006, an architect at the research and design office "Arhitektoniskās izpētes grupa". Participated in project design for restoration and conservation of historical buildings. Fields of research: History and Theory of Architecture and Arts, Structures and Materials of Historic Buildings, Conceptual and Strategic Issues of Architectural Heritage Conservation. As a researcher and manager conducts artistic research in architecture, research in

cultural history and construction history and provides expertise at typologically different sites of 13-20 centuries, such as Riga, Ventspils, Limbaži, Svēte, Lielstraupe Castles, Skaistkalnes Monastery, Nurmuiža, Šeppmuiža, Ungurmuiža, Kabile, Eleja, Valdgale, Nordeķu, Liepupe, Preiļu, Riebiņu, Varakļānu, Pope manors, etc., buildings, in Riga: ("Dannenstern" House, in 23 and 26 Mārstaļu Street, 21 Pils Street, 6 M.Pils Street, 16 Smilšu Street, 14 Alksnāju Street, 23 Elizabetes Street, "Jēkaba kazarmas" barracks etc.), Lestene church, Ķemeri sanatorium, buildings in Cēsis, Bauska, Liepāja, Kuldīga, Ventspils, and other Latvian towns. Architect-researcher within Riga St. Jackob's Cathedral renovation project (since 2014). Architect-researcher in Riga Castle research (since 1994).

Selection of the academic staff members is based on their scientific and teaching experience, fields of research and achieved results with regard to specifics of the study program and study courses. The academic staff involved in the implementation of the study program conducts research through participation in international research projects and regularly publishes research results at internationally recognized publishing platforms. The academic staff are also given an opportunity to advance their professional competencies and extend international cooperation experience through the mobility program Erasmus+, COST or others, which promote the single European architectural educational area, and through the on-the-job training.

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

Implementation of the study program involves only the academic staff of high scientific qualification to make achievement of the goals of the study courses as effective and student-centered as possible. Altogether the implementation of the PhD study program involves over 10 members of academic staff and visiting lecturers who advance their knowledge and competencies to improve the quality of studies, to optimize them according to the industry demand, to modernize and to digitalize them, in order to provide students with up-to-date architectural education.

During the reporting period, 2 doctors of science (Edgars Bondars and Ilmārs Dirveiks) joined the study program, supplementing the range of research fields and the scope of opportunities to choose proper fields of the industry and research. The qualification of the academic staff at the study program meets the program requirements.

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

Research and creative work outcomes of the academic staff and personnel are published in scientific journals and conference proceedings, as well as displayed at the architectural and art exhibitions. The Faculty of Architecture publishes the collection of articles *Arhitektūra un pilsētplānošana* (Architecture and Urban Planning) in the series of RTU scientific readings. Every year academic staff of the AF publish over 40 articles in different local and international scientific editions and present over 20 reports at the local and international scientific conferences. The diversity of themes and genres demonstrates wide spectrum of interests that ensures the information and creative diversity of the training. The list of scientific publications developed by the academic staff at the study program during the reporting period:

2020

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Dirveiks, I. Mālpils muižas oranžērija. Māksla vēsture un teorija, 2020, No. 24, pp. 6-17. ISSN 1691-0869

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Treija, S., Bratuškins, U., Barvika, S., Bondars, E. The Liveability of Historical Cities: Current State and Prospects for Habitation. No: Global Dwelling: Approaches to Sustainability, Design and Participation, Lielbritānija, Manchester, 23.-23. septembris, 2016. Manchester: WIT Press, 2020, pp. 15.-26. ISBN 978-1-78466-219-6. e-ISBN 978-1-78466-220-2. ISSN 1746-4498. e-ISSN 1743-3509.

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Bratuškins, U., Treija, S. Formation en architecture à l'École polytechnique de Riga jusqu'en 1914. La Revue de la BNU, 2019, No.19, pp. 52-59. ISSN 2109-2761.

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Teaching staff of the doctoral study program “Architecture” – Latvian Council of Science experts

Name	Surname	Branch of science	Term
Sandra	Treija	Humanities and Arts - Music, Visual Arts and Architecture	20.02.2022
Jānis	Krastiņš	Humanities and Arts - Music, Visual Arts and Architecture	17.06.2023
Edgars	Bondars	Humanities and Arts - Music, Visual Arts and Architecture	17.06.2023.
Uģis	Bratuškins	Humanities and Arts - Music, Visual Arts and Architecture	20.02.2022

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

The academic staff involved in the implementation of the study program takes part in scientific research and artistic innovation, systematically doing research in theory and history of architecture, protection of cultural monuments, urban and spatial planning.

The fields of research addressed by the academic staff of architectural programs correspond to modern trends in the theory of architecture, protection of cultural heritage, evaluation of the impact of climate change on sustainable environment planning, linking urban development strategy to social processes and visual interpretation of spatial environment in design, including application of ICT in project design and planning.

The academic staff of the study program are implementing national and international research projects:

“BuildDigiCraft: New MINDSET for high-quality European Baukultur: bridging DIGITAL and CRAFT” (ERASMUS+, leading partner HafenCity University (Hamburg, Germany), since 2019, Project Manager Prof. U. Bratuškins, participants Prof. S. Treija and PhD students M. Babris and E. Markus.

“**Up-to-date information systems in urban regeneration**”, project of Latvia-Lithuania-Taiwan Scientific Cooperation Foundation, since 2020, team members: S. Treija, U. Bratuškins, PhD student A. Koroļova, Kaunas Technology University and TaiwanTech.

“The Identity of Architecture and Urban Environment of Riga in XX and XXI centuries” (State Research Program, 2012-2016), which determines the factors that form Riga architecture and urban identity, and promotes understanding of the most significant development trends in XX

and XXI centuries. Project Manager: Prof. U. Bratuškins, team members - Prof. J. Krastiņš, Prof. S. Treija, researcher T. Kokins.

“The Big Reset on Neighborhood Design” (Erasmus+, 2014-2017). The project challenging the role of urban planners and designers, based on the idea that modern environment is not a statistic notion, but is rather a fluid concept opened for a variety of interpretations. The project plans to clarify whether the environment can be designed and planned. This assumption evokes the idea to work on collective space systems and facilities, improving their individual opportunities: network and multifunctional sites. Responsible academic staff: prof. U. Bratuškins, pract. assist. prof. E. Bērziņš.

VPP “Letonika” project “**Identification and Actualization of the Heritage of Latvian Art and Architecture**” (Project Manager Prof. Dr. habil. arch. J. Krastiņš).

OIKOnet A Global Multidisciplinary Network on Housing Research and Learning – LifeLong Learning Programme, Erasmus. Project Manager Prof. S. Treija, team members: Prof. U. Bratuškins, assist. prof. E. Bondars. Available at: http://www.oikonet.org/;

“**Improvement of Technological Solutions of Energy Efficiency of Buildings”** (State Research Program, 2018-2021). The project develops new technological solutions for improvement of energy efficiency of the existing building systems (heating, hot water, ventilation and air conditioning); nearly zero-energy buildings. It will be implemented based on different scientific research approaches and combinations: experimental research, real time measurements (in-situ), data collection, analysis and computer modelling. The project team has a vast experience in energy efficiency, for example, in development of new technologies, evaluation of energy consumption, analysis of energy saving, energy efficiency activities, energy management, energy efficiency policies, using of various approaches. The team consists of the certified energy auditors, architects, heating engineering, building doctors, chemists and modelling specialists. Academic staff involved - Prof. S.Treija, assist. prof. E. Bondars Available at: https://videszinatne.rtu.lv/zinatne/projekti-un-petijumi/i-beet/

“European Middle Class Mass Housing COST Action CA18137” (COST Action, 2018-2022). The project is focused on the establishment of a trans-country network to unite European researchers who conduct research in the field of middle-class mass housing (MCMH) built in Europe since the 1950’s. In urban and architectural research, MCMH usually is evaluated as low, but comparative analysis and global perspective has not been shaped yet. When using different approaches, the main attention will be focused on architecture, urbanism, planning, state policies, history, sociology, which will result in new concepts and methodologies. It is planned to increase knowledge about the interaction of spatial forms, behavior and satisfaction and to integrate methods of architectural and social analysis. Academic staff involved - Prof. Sandra Treija.

Available at: https://www.cost.eu/actions/CA18137/#tabs|Name:overview

“Cities & Rail: Increasing Potentials for Smart & Just Cities” (Baltic Sea Cooperation Seed Funding**,** 2018-2019). The project aims to study how towns in the Baltic Sea Region can optimize and use a new investment potential in the railway network both related to sustainability and equality aspects of mobility. A lot of investments are channeled to the railway infrastructure around the Baltic Sea. We propose to investigate sustainability and equality aspects of these investments in cooperation with Swedish, Estonian and Latvian partners. While the project is led by academic institutions, it will involve important stakeholders, such as regional and municipal policy makers, regional and municipal transportation companies, urban planners and architects, as well as different social groups. Academic staff involved - Prof. U. Bratuškins, Prof. S. Treija, assist. prof. E. Bērziņš

Urban Allotment Gardens in European Cities – Future, Challenges and Lessons Learned – TUD COST (European Cooperation in Science and Technology) Action TU1201. Management team member Prof. S. Treija.

"**Implementing nature-based solutions for creating a resourceful circular city** COST CA17133" (COST Action, 2018-2022).

The project considers the problems of natural resource depletion, climate change and degradation of ecosystems faced by cities across the world, and these will continue growing if cities do not adapt to the situation. One of the elements in this transition is introduction of nature-based solutions (NBS). They can offer a range of ecosystem services beneficial for urban biosphere, for example, regulation of microclimate, flood prevention, water purification, provision of food and many others. Acceptance of the concept of circular economy bringing together different kinds of services and returning the resources back to the city would increase the benefits gained by cities. Involved academic staff and project team - PhD student A. Koroļova; Prof. Sandra Treija.

Available at: https://www.cost.eu/actions/CA17133/#tabs|Name:parties

Restructuring of Study Programme in Architecture to Long-cycle Integrated Master in Line with EU Standards, 530440-TEMPUS-1-2012-1-METEMPUS-JPCR. Project Manager Prof. U. Bratuškins, team members: Prof. S. Treija, assist. prof. A. Lapiņš.

Project L8431 "**Āra peldbaseinu izbūves iespēju analīze**" (Feasibility study of open-air pool construction), commissioner PLLC "Rīgas Siltums", RTU AF, SGŪTI. 25.05.2017.–18.10.2017. (Project Manager assist. prof. E. Bondars, researcher S. Barvika).

In cooperation with LLC "Liepājas reģiona tūrisma informācijas birojs" lectures "Liepājas jūgendstils" (Liepaja Art Nouveau Architecture) within the courses for the tourist guides and preparation of exam questions (executor Prof. J. Krastiņš).

In cooperation with Vilnius Gediminas Technical University, review of the PhD Thesis by Matas Cirtautas "**Peculiarities of Urban Expansion in Lithuania**" (executor prof. U. Bratuškins). In cooperation with Ventspils municipality museum "Ventspils Muzejs", expert advice in the jury committee of draft design for a **draft design of a multifunctional building and landscaping in the Seaside Open-air Museum**, 2 Riņķu Street, Ventspils (executor Prof. J. Krastiņš).

In cooperation with Slovenian Research Agency (NM 88431452), **revision of scientific research projects** (executor Prof. J. Krastiņš).

In cooperation with Podkowa Leśna Centre for Culture and Citizen Activities (Poland), a conference report about the garden city festival "The **Mežaparks genesis and urban development**" (executor Prof. J. Krastiņš).

In cooperation with PLLC "DELFI", content shaping in terms of the State Cultural Capital Foundation project "**The cycle of multimedia educational lectures on the history of the Latvian culture**" (executor Prof. J. Krastiņš).

At the Art Academy of Latvia, revision of the PhD Thesis by Aleksandrs Bertašs **"Construction of Orthodox churches in Latvian and Estonian territories from the second half of 1840s to 1914"** (executor Prof. J. Krastiņš).

Publication of the book "**Jūgendstila arhitektūra Latvijā. Art Nouveau Architecture in Latvia**" by the publishing house "Madris" (executor Prof. J. Krastiņš).

Themes of theoretical works and practical tasks of the study programme are regularly précised and enhanced according to the latest developments in the industry. Research and creative work

outcomes of the academic staff and personnel are published in scientific journals and conference proceedings, as well as displayed at architectural and art exhibitions. The faculty of architecture publishes the collection of articles *Arhitektūra un pilsētplānošana* (Architecture and Urban Planning) in the series of RTU scientific articles. Every year AF academic staff publish over 40 articles in different local and international scientific editions and present over 20 reports at local and international scientific conferences. The diversity of themes and genres demonstrates wide spectrum of interests that provide information and creative diversity of the training.

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

Cooperation between the members of academic staff at the study program is maintained both during the semester delivering the study courses and planning the changes to the study program and its development for the coming semesters and within the study program in general. In order to provide daily communications and promote cooperation among the academic staff and PhD students, the appropriate environment has been established to let the academic staff members meet and maintain formal and informal communication, to promote improvement of the study courses and their mutual integration.

Updating of the study courses is made regularly based on both student suggestions and trends of industry development. During implementation of the study courses, regular meetings and curricular meetings of the academic staff take place, where they share their experience concerning the themes of the study courses, as well as elaborate and update the curricula, adopting themes, fields, responsibilities and regulatory requirements by mutual agreement. The approval of study courses involves all academic staff working at a certain study course, thus ensuring that the themes within the study program are continuously enhanced and updated in cooperation with the involved industry professionals.

The study courses in the compulsory and compulsory elective parts are planned by thematic blocks. These blocks are cross-coordinated so that the study courses do not overlap and students are provided with the necessary basic knowledge in each field. Cooperation between the academic staff members at the study program is based on understanding of the thematic structure of the study program. Cooperation mechanisms are selected based on individual loads of the academic staff members, thematic interrelation of the study courses (consistency, continuity, complementarity), previous cooperation experience of the academic staff. Within the study program, cooperation of the academic staff members is organized so as to promote achievement of the learning outcomes. By reviewing and updating the study program, the members of academic staff mutually agree on the most appropriate and effective solutions for evaluation of student achievements and achievement of performance indicators. Periodically discussing and reviewing the curricula of the study courses, thematically coordinated and complementary acquisition of the study program is ensured, topic overlapping at different courses within one study program is prevented.

Cooperation of the members of academic staff occurs withing a certain study course, in collaboration with responsible academic staff, PhD students, industry professionals, and between the study courses with related themes, where acquisition of similar themes is necessary at different

levels of awareness (general, detailed, methods of application, etc.). When planning the academic year and approving the tasks of the study course projects, the previously identified shortcomings are taken into account and corrections are made.

The ratio of the number of students and lecturers within the study program is 1 lecturer for 2 students.

Annexes

III - Description of the Study Programme - 3.1. Indicators Describing the Study Programme		
Sample of the diploma and its supplement to be issued for completing the study programme	RADA_dipl_EN.zip	RADA_dipl_LV.zip
For academic study programmes - Opinion of the Council of Higher Education in accordance with Section 55, Paragraph two of the Law on Higher Education Institutions (if applicable)	EN_Nr_83_RTU_Dokt_Arhitekt_par+250+stud.pdf	Nr_83_RTU_Dokt_Arhitekt_par+250+stud.pdf
Compliance of the joint study programme with the provisions of the Law on Higher Education Institutions (table) (if applicable)		
Statistics on the students in the reporting period	Annex5_Arch_RADA_Statistics_EN.pdf	5pielikums_Arch_RADA_Statistics_LV.pdf
III - Description of the Study Programme - 3.2. The Content of Studies and Implementation Thereof		
Compliance with the study programme with the State Education Standard		
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard or the requirements for professional qualification (if applicable)		
Compliance of the study programme with the specific regulatory framework applicable to the relevant field (if applicable)		
Mapping of the study courses/ modules for the achievement of the learning outcomes of the study programme	RADA_Kartejums_EN.xlsx	RADA_Kartejums_LVv.xlsx
The curriculum of the study programme (for each type and form of the implementation of the study programme)	RADA_Planning_EN.pdf	RADA_Planojums_LV.pdf
Descriptions of the study courses/ modules	Doct_Arch_study_courses_ENG.zip	Dokt_Arh_studiju_kursi_LV.7z
Description of the organisation of the internship of the students (if applicable)		
III - Description of the Study Programme - 3.4. Teaching Staff		
Confirmation that the academic staff of the doctoral study programme includes not less than five doctors, of which at least three are experts approved by the Latvian Council of Science in the branch or sub-branch of science in which the study programme intends to award a scientific degree (if applicable)	Confirmation - on compliance of the academic staff of the doctoral study programmes.zip	Apliecinājums - LZP eksperti doktora programmā.zip
Confirmation that the academic staff of the academic study programme complies with the requirements specified in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions (if applicable)	Confirmation - on compliance of the academic staff.edoc	Apliecinājums - AL 55. pants par prof. skaitu akadēmiskās programmās.edoc

Heat, Gas and Water Techology (42582)

Study field	*Architecture and Construction*
ProcedureStudyProgram.Name	*Heat, Gas and Water Techology*
Education classification code	*42582*
Type of the study programme	*Professional bachelor study programme*
Name of the study programme director	*Egils*
Surname of the study programme director	*Dzelzītis*
E-mail of the study programme director	*egils.dzelzitis@rtu.lv*
Title of the study programme director	*profesors/ Dr.habil.sc.ing.*
Phone of the study programme director	
Goal of the study programme	*The aim of the study programme is to educate and train highly qualified professionals in the field of heat, gas and water technology, that have high competitiveness in the labor market in Latvia and abroad. The programme is developed in accordance with "Civil engineer of engineering systems " standard requirements.*
Tasks of the study programme	*The tasks of the study programme:* *- to ensure relevant and competitive education in compliance with professional Bachelor study level;* *- to provide students with the required theoretical knowledge in building science, mechanics and environmental protection;* *- to provide students with in-depth knowledge in the field of heat, gas and water technology and related subject;* *- to develop competence and professional skillset corresponding to the field of study;* *- to develop student ability to adapt theoretical knowledge in independent problem solving environment, as well as in performing engineering-related tasks;* *- to ensure at least 24 weeks long practical work experience.*

Results of the study programme	*Learning outcomes of the study programme:* *- students are familiar with building engineering systems' and urban infrastructure systems' design, installation and operation requirements as per compliance with local and regional building norms;* *- students able to perform their work, in compliance with the requirements of the binding, industry-specific, system-process-, and product-related norms and regulations and standards;* *- students are able to identify, assess, manage and develop building engineering systems' and urban infrastructure systems' design, installation and operation processes, quality assurance factors and systems' interaction, as well as systems' upgrade and modernization measures;* *- students are able to understand building engineering systems' and urban infrastructure systems' design, installation and operation processes from organizational-planning and budget-planning standpoint;* *- students are able to plan and project in the long-term the necessary resources for a successful and streamlined operation of a construction firm or a municipal entity in the related industry;* *- students are able to determine the required competence level, skillset and responsibility distribution of employees to ensure construction firm's or municipal entity's successful operation;* *- students are able to supervise and perform the design, installation and operation of building engineering systems and urban infrastructure elements;* *- students are able to develop and implement the design, installation and operation of building engineering systems and urban infrastructure components in accordance with the innovative approaches and principles;* *- students are able to carry out research work of a scientific value in the field of design, installation and operation of building engineering systems and urban infrastructure elements, as well as interpret and analyze the acquired results;* *- students are able to continue their career in the role of a engineer, as well as continue their academic education in Master study programmes.*
Final examination upon the completion of the study programme	*In the end of study students defend the Bachelor thesis with engineering project.*

Study programme forms

Full time studies - 5 years - latvian

Study type and form	*Full time studies*
Duration in full years	*5*
Duration in month	*0*
Language	*latvian*
Amount (CP)	*200*

Admission requirements (in English)	*secondary education or professional secondary education*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Professional Bachelor Degree in Heat, Gas and Water Technology*
Qualification to be obtained (in english)	*Building engineering systems engineer*

Places of implementation

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

Part time extramural studies - 6 years - latvian

Study type and form	*Part time extramural studies*
Duration in full years	*6*
Duration in month	*0*
Language	*latvian*
Amount (CP)	*200*
Admission requirements (in English)	*secondary education or professional secondary education*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Professional Bachelor Degree in Heat, Gas and Water Technology*
Qualification to be obtained (in english)	*Building engineering systems engineer*

Places of implementation

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

3.1. Indicators Describing the Study Programme

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

Professional Bachelor study programme "Heat, Gas and Water Technology", education classification code 42582. Accredited by the decision of the Study Accreditation Commission of the Ministry of Education and Science of the Republic of Latvia, 29 May 2017 - Accreditation certificate No. 2020/39.

The recommendations identified for improvement of the programme in the previous period have been taken into account and the following improvements have been made:

1. Improvements have been made to the internship part of the study programme, i.e., learning outcomes have been defined and better integrated into the study process, as well as academic supervision and appropriate evaluation have been ensured:

- acquiring skills and competences at the place of internship on the basis of the knowledge provided during the specialisation courses;
- development of an engineering project.

Improvements were approved in new wording by the Senate decision as of 28 January 2019 (Minutes No. 526) "On Internship Organisation Procedure at RTU".

The description of study courses defines the aims, tasks and the learning outcomes. The supervision implemented by the academic staff in the course of study shall be exercised in the form of tutorials.

2. The volume of laboratory works has been increased to strengthen the theoretical knowledge:

- the transformation of theoretical education into practice and the extension of competences: in the study courses "Ventilation", "Heating" and "Alternative Energy for Building Heat Supply", extended practical works with measurement, data processing and analysis have been introduced;
- increased number of training stands and volume of practical works: heating and ventilation boards have been installed; mobile power supply equipment for testing solar panels has been manufactured;
- new modern specialised software has been introduced into the study process: in the study courses "Heat Transfer in Building Construction" and "Modern Zero Energy Buildings", the following dynamic simulation applications have been used: IDA-ICE; TRNSYS, DEPHIN, THERM, etc., and MagicCad software has been introduced in the study courses "Ventilation", "Heating" and "Air Conditioning".

3. Recognition of previous non-formal education and professional experience has been carried out: the study programmes "Transportation Engineering" and "Heat Power and Thermal Engineering" have been recognised before pursuing studies at the Master programme "Heat, Gas and Water Technology". Approved by the Senate decision as of 23 September 2019 (Minutes No. 632)

“Procedure for Recognition of Competencies Developed Outside Formal Education or from Professional Experience and Learning Outcomes Achieved in Previous Education at Riga Technical University”.

In cooperation with the Certification Centre of the Association of Heat, Gas and Water Technology Engineers of Latvia, engineers of other related specialties are offered to acquire individual courses and to apply for a certificate in construction practice.

4. The study course modules in English have been developed and provided. Study courses in heat transfer in building constructions, building heating and ventilation are delivered to foreign students;

5. The development of the programme is based on recent international industry achievements and trends. The study courses shall include knowledge developed in the Federation of European Heating, Ventilation and Air Conditioning Associations (REHVA), as well as information from the results of the activities of the Educational Technology Committee. There is a sustainable link between students and Europe’s latest research and development areas.

6. Part of the programme has been provided in the distance learning mode: a) The studies continue at Daugavpils Study and Science Centre for the senior years, switching to studies at RTU External and Part-Time Studies Department; b) Availability of study course materials in ORTUS e-learning environment with the online feedback option: during Covid-19, the study process is organised in ORTUS e-learning environment; c) The number of video lectures recorded has increased – in 2020/21 academic year, lectures were recorded and used to organise a distance learning process.

7. Liepaja and Daugavpils branches have been restructured; all practical work is taking place in Riga.

8. Improvement the growth potential of academic staff in the process of implementation (intended to be approved in academic year 2021/2022). During the preparatory phase, the decision of the RTU Senate is being developed based on the Cabinet Regulations No. 129 as of 25 February 2021 “Procedure for Evaluating the Results of the Work of the Applicants for the Positions of Professors or Associate Professors and Assessment of Scientific and Pedagogical Qualifications or Results of Artistic Activity of Elected Professors or Associate Professors” in accordance with Section 34 of Chapter 5 of the Law on Higher Education Institutions – clear benchmarks for professional development have been developed.

9. The working time of the library has been extended - the unlimited reach of information is ensured. The library services are available at the Scientific Library of RTU at 5 Paula Valdena Street. Working time is 9.00-19.00 also on Saturdays, during the examination period: throughout the whole day. During the pandemic, by prior appointment, online for receipt/transfer of books 24 hours a day.

10. In the execution process, the premises are being restored (in accordance with the plan). Commissioning of the building recommended by the Faculty of Civil Engineering in August 2021. The study programme will be implemented in the renovated premises. The Institute of Heat, Gas and Water Technology has been granted new facilities, including those for practical work. To date, the classrooms allocated to the Institute have been transformed into shared use lecture halls, thereby optimising the capacity of premises. The number of laboratories at the Institute’s disposal has increased; new premises for practical work have been created: a ventilation laboratory; a hydraulic systems laboratory.

11. Study courses have been improved and new ones introduced in line with higher education standards at the European level, as well as meeting the requirements of the new standard professional of *civil engineer of engineering systems* (see paragraph 12).

- New study courses have been introduced in Section A.2: "*Innovative Product Development and Entrepreneurship*" and "*Solid Waste Management*";
- In the light of the field recommendations, a new study course has been introduced: "*Cooling and Refrigeration*", replacing the study course "*Refrigeration Equipment*".
- Changes have been made in line with the latest industry trends in the following study courses: "*Gas Supply*", "*Energy Efficiency of Buildings*", "*Heating*", "*Ventilation*", etc.
- During the reference period, the following study courses have been removed from the list of study courses: "*Heat Sources for Building Heating*", "*Engineering Systems for Low-Rise Building*" and "*Construction Legislation and Regulations*".
- The content of courses "*Heat Sources for Building Heating*" and "*Engineering Systems for Low-Rise Building*" has been integrated into the study courses "A*lternative Energy Sources for Building Heating*", "*Heat Supply*", "*Water Supply*" and "*Wastewater Collection*".
- The study course "*Construction Legislation and Regulations*" became obsolete and could not reflect all changes in the sector. Consideration of the legislative aspects is done within all field-specific study courses.
- The study programme include a new study course "*Innovative Product Development and Entrepreneurship*" (6 CP). This course creates an in-depth understanding of business start-ups and developments from business ideas to finished products.

12. The standard of supplementary qualification was changed, since a new professional standard for civil engineer of system engineering was introduced on 13 October 2021. No. 188 https://registri.visc.gov.lv/profizglitiba/dokumenti/standarti/2017/PS-188.pdf(in Latvian), for which the study programme was improved accordingly.

13. Due to insufficient student demand, part-time intramular study is no longer planned.

For outline and descriptions of the study courses, see Annexes 9 and 10.

The study programme is implemented on the full-time intramural and part-time extramural basis. The study programme is implemented in Riga, and the language of instruction is Latvian.

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

The Professional Bachelor Study Programme "Heat, Gas and Water Technology" code 42582 has been developed in accordance with the Law on Higher Education Institutions of the Republic of Latvia and the Classification of Education of the Republic of Latvia. The principles of the Latvian Qualifications Framework (LQF) and the European Qualifications Framework (EQF) are maximally observed during the implementation and development of the study programme.

Programme code 42582 complies with Cabinet of Ministers Regulation No 322 Latvian Classification of Education. The first and second levels of classification, represented by the first two digits of code 42, are Second-level vocational higher education (fifth-level vocational qualification and professional bachelor's degree) or Second-level vocational higher education (fifth-level vocational

qualification), to be followed by general or vocational secondary education. The third, fourth and fifth levels of classification (thematic groups, subject areas and programme groups), denoted by the next three digits 582, are Civil Engineering (58 stands for Architecture and Civil Engineering).

The study programme has been developed taking into account strategic objectives of RTU, market supply and potential demand. The title of the study programme, the awarded degree, professional qualifications, aims and tasks are interrelated. The curriculum has been systematically designed to let alumni build their career in the construction industry. The study programme educates and trains specialists in the heat, gas and water technology sector, who have a deep understanding and the skills needed to plan, organise and manage development or construction work of a building project, and who are able to follow the development of heat, gas and water technologies and participate successfully in the deployment of these technologies.

Candidates with the secondary or compatible education may enrol in the study programme. RTU students that completed a three-year first level professional education in civil engineering may also enrol in the study programme. When matriculating RTU students with first-level professional higher education in civil engineering, the courses acquired previously are recognised. Matriculation procedure to Bachelor study programmes is regulated by the RTU Senate approved “Enrolment procedure for academic and professional graduate study programmes”.

The aim of the study programme is to educate and train highly qualified professionals in the field of heat, gas and water technology, that have high competitiveness in the labor market in Latvia and abroad. The programme has been developed in accordance with the requirements of the “CIVIL ENGINEER of SYSTEM ENGINNERING" profession qualification standart (Approved 13.10.2021.)

https://registri.visc.gov.lv/profizglitiba/dokumenti/standarti/2017/PS-188.pdf (In Latvian)

The main target of the study programme is prepare Alumni who:

- are able to start their individual career or continue studies pursuing academic or professional Master degree; - able to master theories, consistent patterns and technologies related to heat, gas and water technology;
- are able to demonstrate comprehensive knowledge of facts, theories and patterns, necessary for personal growth and development, civil participation, social integration and further education;
- are able to understand in detail and show the knowledge of various specific facts, principles, processes and notions for certain regular and irregular situations in academic or engineering fields;
- know technologies and techniques needed for fulfilment of learning or work tasks;
- are able to plan and organize work processes using different methods, technologies, tools and materials for fulfilment of tasks;
- are able to find, evaluate and use creatively the information in learning or professional tasks and for problem solving;
- are able to cooperate, plan and fulfil learning or professional tasks working individually, in a team or managing team work;
- are able to develop autonomously and improve their professional skills.

The study programme is carried out in the form of full-time intramural and part-time extramular. Full-time students are mainly secondary or professional leavers, without experience in this field, and can therefore attend day department studies and provide appropriate contact hours to acquire the knowledge and skills provided for in the study programme. On the other hand, part-time students are the most commonly practising engineers who already work in this area, this form has fewer contact hours, so students can combine work with studies thereby improving their

competence. Given the number of students, it can be concluded that both of these forms have been requested.

The study programme is professional; thus, it always offers learning field trips and exchange of practical information at the enterprises and practical classes to improve skills and competences of students according to the set learning outcomes of the study programme.

The study programme promotes implementation of the leitmotif of Riga Technical University (RTU) as defined in its 2021-2025 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 educated and trains European and global-level engineers – leaders: developers of new technologies." https://www.rtu.lv/en/university/strategy

The study programme fully complies with the development aim of RTU Faculty of Civil Engineering – to become an internationally recognized leading Latvian educational, research and development institution in the field of civil engineering, providing high quality study process, internationally recognized research and sustainable innovation, commercialization and knowledge transfer for economic development.

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

The **Professional Bachelor Study Programme "Heat, Gas and Water Technology"** is consistent with heating, ventilation, air conditioning and gas supply trends in the EU countries and worldwide. During its development, the changes in the construction industry in Latvia and across Europe were studied. The main emphasis has been placed on the introduction of new technologies as well as "green" technologies in the study process and on the use of modeling software as part of study courses for student training.

According to the International Energy Agency data, in 2019 global energy consumption nearly twice exceeded the average growth rate since 2010. The largest final energy consumption in the world, around 40% (2019), is associated with buildings and structures where heating, ventilation and air-conditioning systems are the main energy consumers.

Increasing energy efficiency in buildings is closely linked with the modernisation of built-in engineering systems. Therefore, the courses of the study programme are designed to prepare engineers for large stock companies, construction and design firms, as well as local government companies providing urban and other residential infrastructure – heating, gas supply, water supply and sewers, the necessary modernisation, operation and maintenance of engineering systems built into buildings, as well as to educate and train highly-qualified specialists for the projecting of building engineering systems and for the management of assembly works.

Several courses are interrfelated and the learning outcomes of one course refer to the tasks of the following course. For example, in the course *BSG305 "Heat Supply"*, the learning outcomes are directly related to the tasks of the course *BSG357 "Planning of the Infrastructure in the Towns"* and *BSG354 "Alternative Energy for Building Heat Supply"*. The study courses "*Heating*" and "*Ventilation*" are delivered in a single semester, resulting in the development of a joint study project. The study courses "*Measurement and Verification of Building Systems*" and "*Technical and*

Economical Evaluation of Building Systems Projects" are delivered together to provide students with comprehensive knowledge of the energy performance of buildings. Students can acquire in-depth knowledge about the energy performance of buildings in the framework of the study course "*Modern Zero Energy Buildings*".

The study programme is being improved to make it appealing for young professionals. Research and analysis are carried out considering other universities across different European regions in order to improve the study programme as comprehensively as possible. The study courses within the study programme are based on general trends in construction industry – they are included in the study courses, also the general professional understanding of the study courses needed to be mastered by the professionals in the field is also covered. The study programme is modern and follows the latest trends outside Latvia, as well as it is specific enough in Latvia to claim that it has its own well-defined place in the family of other study programmes in the field of engineering sciences.

The academic staff of the programme regularly follow and update the study courses so that they are based on the achievements and acknowledgements of the respective field of science. Course descriptions will be approved by the Programme Director and the Head of Department prior to the start of each semester to keep abreast of academic staff workload and possible development. The teaching staff also update the content of study courses in accordance with the trends of scientific development, using information available in the databases of scientific articles - EBSCO, Emerald, Scopus, Web of Science, etc. Academic personnel are motivated to publish the results of their research, especially in the scientific databases SCOPUS and Web of Science, with a royalty for each article published in these databases, thereby increasing their competence and maintaining the rights of the expert of the Latvian Council of Science. The results of the academic staff development are evaluated each year during the annual appraisal and the results are used to plan further professional advancement of each member of the academic staff.

Based on the information from the Central Statistical Database, it may be concluded that the demand for highly qualified specialists in civil engineering is variable, yet growing spirally, which is impacted directly by the global economic situation, nevertheless in the future it is expected only to increase, thus allowing to conclude that the study programme is important and significant in promoting economic activities in Latvia and Europe (see Table).

Employed by economic activity								
Economic activity	Number (thsd)							
	2013	2014	2015	2016	2017	2018	2019	2020
Agriculture, Forestry and Fishing	71.9	66.4	71.1	68.7	61.4	63.3	66.3	64.3
Mining and quarrying	2.8	3.7	3.9	3.4	2.3	3.0	3.2	2.7
Manufacturing	125.7	118.8	116.4	123.5	120.9	116.9	115.1	114.5
Electricity, gas, heat and air conditioning supply	**11.7**	**10.0**	**12.6**	**14.0**	**13.1**	**12.3**	**9.4**	**10.7**
Water supply, sewerage, waste management and remediation activities	**6.2**	**5.2**	**7.1**	**8.3**	**9.1**	**7.9**	**6.7**	**6.2**
Construction	67.3	73.2	71.9	66.1	63.1	74.6	81.1	76.5
Information and communication	24.3	26.3	26.0	23.8	28.3	29.0	25.6	31.1
Real estate activities	22.7	20.7	20.7	21.4	19.8	20.4	21.7	19.7
Professional, scientific and technical activities	34.4	36.1	36.2	33.6	39.6	36.3	33.4	37.0
Education	94.6	85.1	83.4	81.7	82.3	83.3	83.3	81.6
Other service activities	16.8	14.7	18.0	19.9	21.0	18.2	16.4	21.2

Furthermore, the study programme is improved after evaluation of the final examinations, as representatives of employers regularly take part in the work of Graduate Paper Examination Committees to assess the knowledge acquired by students within the study programme.

Participating in the work of the Graduate Paper Examination Committees representatives from the industry can express their suggestions concerning the desired topics for student research in demand in the labour market. These recommendations are taken into account while improving the courses of the study programme for the next academic year.

When analysing the employment of graduates, it should be noted that they are mainly employed in private companies, municipal development departments and construction boards, design companies, public administrations and other sector-related organisations. These include (A/S Rīgas Siltums, A/S Gaso, CMB Inženieru centrs, A/S Salaspils Siltums, SIA Rīgas Ūdens, SIA Valmieras Ūdens, A/S Gaso, A/S Conexus. Many students find a job during their internship, and around 90% continue to work in their internship after graduation.

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

The Professional Bachelor Study Programme "Heat, Gas and Water Technology" in the reporting period was implemented in Latvian on the full-time and part-time basis. Since students have not been admitted in full-time extramular form since previous accreditation, this form will no longer be marketed and there is no statistical data.

Form of full-time study:

Number of students: In April 2021, the total number of students at the programme "Heat, Gas and Water Technology" was 362 students, which was by ~ 67% more than in 2017 (244 students). Given the statistics of recent years on the number of students enrolled, it can be argued that the number of full-time students is increasing.

Distribution according to the source of funding: In the last two academic years (2019/2020 and 2020/2021 academic years), there were no tuition fee paying students even though the number of tuition fee paying students in the programme is not limited. In the reference period, the proportion between state budget places and tuition fee places is with a slight variation of around 96% (state budget places) and less than 4% (tuition fee places).

Number of graduates: In 2019/2020 academic year, 27 graduates were awarded a Professional Bachelor Degree in Civil Engineering. Compared with 2016/2017 academic year, the number of graduates increased, which could be rated as a positive indicator.

Drop-out: In 2019/2020 academic year, 44 students were expelled for a variety of reasons, it was 3 times more than in 2016/2017 academic year.

The main reasons for drop-out:

- failure to pass the study courses, for example, in academic year 2016/2017, 10 out of 14 expelled students were extramatriculated exactly due to academic underachievement, in 2017/18, 39 out of 62 students, in 2018/19, 17 out of 32, while in 2019/2020, 35 out of 44 expelled students were exmatriculated for this reason;
- students drop out of higher education institution due to social causes/family conditions and do not resume studies after academic leave; the number of students varies from 4-8 students during the reporting period;

- due to the epidemiological situation which affected the study process of the last semester; students admitted that they were unable to fully adapt to remote studies and were unable to complete study courses on time.

But students also renew studies after expulsion due to all above mentioned reasons, which is estimated as a good indicator. For example, in academic year 2016/17, 8 students resumed studies, but in academic year 2019/20, there were 10 students. It can be concluded that in the majority of cases students were expelled due to unproficiency.

Full-time students of the study programme are offered an opportunity to take part in the international student exchange (mobility) project Erasmus+, BALTECH, etc.

Form of part-time study:

Form of part-time study:

Number of students: In April 2021, the total number of students at the programme "Heat, Gas and Water Technology" was 81 students, which was by ~ 17% less than in 2017 (98 students). Given the statistics of recent years on the number of students enrolled, it can be argued that the number of the number of students in part-time study hardly not changed.

Distribution according to the source of funding: Part-time studies have been carried out only for a fee paying.

Number of graduates: In 2019/2020 academic year, 8 graduates were awarded a Professional Bachelor Degree in Civil Engineering. Compared with 2016/2017 academic year, the number of graduates not changed.

Drop-out: In 2019/2020 academic year, 26 students were expelled for a variety of reasons, it was 4 times more than in 2016/2017 academic year.

The main reasons for drop-out:

- failure to pass the study courses, for example, in academic year 2016/2017- 6 out of 6 expelled students were extramatriculated exactly due to academic underachievement, in 2017/18- 11 out of 20 students, in 2018/19,-7 out of 10, while in 2019/2020 - 6 out of 18 expelled students were exmatriculated for this reason;
- students drop out of higher education institution due to social causes/family conditions and do not resume studies after academic leave; the number of students varies from 3-6 students during the reporting period;
- due to the epidemiological situation which affected the study process of the last semester; students admitted that they were unable to fully adapt to remote studies and were unable to complete study courses on time.

But students also renew studies after expulsion due to all above mentioned reasons, which is estimated as a good indicator. For example, in academic year 2016/17, 11 students resumed studies, but in academic year 2019/20, there were 10 students. It can be concluded that in the majority of cases students were expelled due to unproficiency.

Taking into account the reconstruction of building and laboratories of the Faculty of Civil Engineering, as well as the Latvian language for the implementation of this study programme, students from abroad are not yet admitted to this study programme. Individual study courses have been delivered to foreign students of other programmes.

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

3.2. The Content of Studies and Implementation Thereof

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

The goals of the **Professional Bachelor Study Programme "Heat, Gas and Water Technology"** are:

- to educate and train competitive engineers in civil engineering who can exercise their profession in practice;
- to train students for individual scientific research and further professional/ post-graduate studies.

The syllabus of the study courses is based on the aims and learning outcomes of the study course, which for their part derive from the aim and learning outcomes of the programme. Such interrelation is clearly seen from the mapping of the study programme (Annex 8).

All study courses in the programme are divided into 6 blocks:

Part A (142 CP) – Compulsory study courses divided into sub-sections – basic study courses, basic profession-oriented theoretical courses and IT study courses, as well as professional specialization study courses.

Part B (16 CP) – Compulsory elective study courses divided into sub-sections – professional specialization study courses, study courses in humanities and social sciences, and languages.

Part C (6 CP) – Elective study courses.

Part D (24 CP) – Internship.

Part E (12 CP) – Final / state examinations, which include a Bachelor Paper including an engineering project.

Each study course has a defined aim and learning outcomes to be achieved. All knowledge, skills and competences in the study course are related and subordinated to the aims and expected learning outcomes of the study programme. The plan of the study programme is given in Annex 9, the descriptions of the study courses – in Annex 10. Each study course provides acquisition of 1

through 5 programme outcomes. Each programme outcome corresponds to at least 1 study course, but on average these are 5 or more courses.

Prior to the start of an academic term, each member of the academic staff has to examine the course description, assessing the existing aims of the course and the expected learning outcomes, and has to examine the learning materials and literature, make sure that the literature is up-to-date and includes the advanced research in the field. Analysis of compliance of the curriculum of the study programme "Heat, Gas and Water Technology" to the state standards allows concluding that the programme complies fully to the requirements. For compliance of the study programme to the state education standard see Annex 6 and for compliance of the study programme to the professional standard see Annex 7. To provide the cross- complementarity of the study courses, as well as to avoid duplication, the academic staff discusses regularly the structure of the study programme. The descriptions of the study courses are available on *ORTUS* platform, so the academic staff has access to descriptions of other study courses which ensures their interconnection.

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

Not relevant

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

Professional Bachelor Study Programme "Heat, Gas and Water Technology" is implemented in the form of full-time intramural and part-time extramural in Latvian language.

Each study course of the defines the knowledge, skills and competences to be acquired, which contribute to the achievement of the learning outcomes of the study programme. The forms of assessment shall be determined by the academic staff in accordance with the learning outcomes of the study course. Each instructor within their study course tests the knowledge, skills and competences of the students specified in the course description (papers, tests, presentations, independent works, case study analyses, group works, etc.). The final grade is the sum of all test papers and examination grades, the percentages of which are also indicated in each course description and presented to students at the beginning of the semester.

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 in ORTUS portal beforehand. During semester, the assessment for each home task, test, report, presentation and any other task is ascrbed 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 program and learning outcomes are taken into consideration.

Most commonly, to assess knowledge and to demonstrate what one has learned within the study course, tests or assignments are used. Skills are assessed mostly through practical, analytical, creative individual and group assignments that require the student to apply the acquired knowledge in practice. In turn, students demonstrate the acquired competences by presenting, discussing and justifying what they have learned in the course, both orally and in writing. The acquisition of knowledge, skills and competences within the study programme includes theory, practical examples, lectures, group assignments, interactive discussions, and lectures delivered by guest lecturers from the industry.

The Professional Bachelor Study Programme “Heat, Gas and Water Technology” is implemented on a full-time basis and part-time extramural basis, with the number of examinations being determined by the amount of credit points within each course.

All study courses included in the study programme are implemented in accordance with the course descriptions. The study courses are evaluated in accordance with the RTU Senate Decision of 29 March 2010 "On the Regulations for Evaluation of Learning Outcomes", the RTU Senate Decision of 25 May 2001 "On the Criteria for Evaluation of Learning Outcomes " and the RTU Senate Decision of 29 January 2001 "On the Transition to a Unified Evaluation of Study Results" in a 10-point system (10 - excellent, 1 - very, very poor). The examinations consist of tests, study papers and exams according to the study plans approved for each semester.

A student can only present their graduate/Bachelor Paper once they have mastered the entire study programme curriculum. Study courses completed with a negative grade must be retaken.

The principles of student-centred education are also taken into account in the implementation of the study process, which is implemented in the following way:

- S**tudent involvement in the study process and its development:** Riga Technical University regularly analyses the questionnaires that each student completes at the end of the semester for each course. The students also organise meetings with the programme director to discuss the positive and negative features of the semester courses, as well as the competence, abilities, attitude and quality of each member of academic staff. In this way, students have the opportunity to influence the study process and contribute to its improvement.
- **Respecting students’ abilities:** Academic staff take into account and respect student diversity and their needs, using different ways of delivering the programme according to students' capabilities.
- **Handling student complaints:** The University has appropriate procedures in place to deal with student complaints. The complaints process is channelled through the Programme Director and the Head of Department, the Head of the Department of Studies or even the

Vice-Rector for Academic Affairs, if necessary. At the Professional Bachelor Study Programme "Heat, Gas and Water Technology ", students first solve problems with the Programme Director, thus the issues to be solved are addressed in a timely manner. For example, if the Programme Director receives a complaint from students about the inadequacy of a course or the incompetence of an instructor, the next step is to find out the reasons and attend the relevant lectures; if the students' complaint is justified, the instructor is instructed to improve the course or is replaced by an instructor whose competence is appropriate for the course.

- **Development of academic personnel competence:** Courses and seminars are regularly organised for academic personnel, both on pedagogical methods and on technological possibilities for improving the quality of courses and their own qualifications. RTU regulations stipulate that a member of academic staff should also deliver guest lectures at foreign universities, which also directly increases their abilities and the quality of communication. In 2021, RTU organised the following training for the personnel - training on the e-learning environment (Moodle), use of Zoom and Teams (which significantly increased the mobility of teaching staff due to the epidemiological situation), training on audio-visual systems for remote lectures, as well as regular trainings on RTU information systems (usage of ortus.lv). Any other type of training for elected academic personnel in their field is also supported.
- **Teaching and learning methods:** Pedagogical methods, ways of teaching, learning and assessment are regularly evaluated. Topical issues are discussed at departmental meetings, at the meetings of the Methodological Council. At the end of the course, students evaluate the performance of each member of academic staff by completing a course evaluation questionnaire. Students have the possibility to apply for personal tutorials, which are organised either systematically every week or by appointment at fixed times. Some courses also use student peer-assessment methods where students engage in group work to facilitate learning.
- **Fostering student autonomy:** Studies rely on the student's autonomy, while at the same time providing guidance and support from the instructor - the description of each study course specifies the scope and content of students' independent work, as well as the methods of its assessment.

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

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/lv/studentuserviss/karjeras-centrs-ssc/karjeras-diena (in Latvian). 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/). 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 provision of internship places to students.

The Professional Bachelor Study Programme "Heat, Gas and Water Technology" includes internship in the volume of 24 CP. Internship is an integral part of a professional study programme, which is to be done according to LR regulations, the resolution of RTU Senate of 29 April, 2002 "On the structure of the second-level professional study programmes" and the resolution of RTU Senate of 28 January, 2019 "On organization of internship at Riga Technical University, new edition".

The ***aim*** of the internship is: To develop ability to join a team, get familiarized with the technical and technological equipment of the company, prepare technical specifications and information materials, fulfil practical tasks by applying the knowledge acquired during studies.

A place for internship can be any company or organization, which allows acquiring the basics of civil engineer job related to construction project design, building project management, technology of construction materials, management of civil works, planning and supervision of civil works, project documentation, procedure of on-site works, experience in working with construction regulations and standards, planning of necessary activities for on-site quality control and labour safety, preparation and control of as-built documentation, supervision and analysis of the works, effective and appropriate use of resources, competence in issues of building operations, use of design software.

If students need it, RTU offers assistance of a student career specialist, who can find a suitable place of internship, but a student also can choose the place of internship individually, which is also the most popular way of finding a place for internship. After that a trilateral cooperation agreement is concluded and internship tasks are carried out during 20 weeks, the agreement states contact persons – an on-site internship supervisor and an internship supervisor at the university. At the university, the internship supervisor is the programme director or other person according to the study plan. The internship supervisor at the university ensures assistance during the internship. Before presentation of the internship report, the internship supervisor at the university reviews it and gives their comments and feedback to the student so that they could amend the internship report and prepare better for public presentation of the report.

Internship includes certain tasks, described in the internship regulation. To achieve an assessment of the internship a student presents the report, which states an internship supervisor's (representative of the internship partner company) assessment, internship log, and defends the internship report within a certain term according to the study schedule.

Professional internship contributes to all learning outcomes, as it is one of the final stages prior to development of a Bachelor Paper including an engineering project. During the internship, a student has to demonstrate the knowledge defined in the study programme, apply their skills and demonstrate the acquired competences. Internship can provide better reflection of student's performance than individual study courses.

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

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

The Professional Bachelor Study Programme "Heat, Gas and Water Technology" envisages a final examination – the Bachelor Paper work with a project part amounting to 12 CP.

The final examination is the analytical work in the field of construction with the part of the engineering project, in which a project of the engineering systems of the building or a city infrastructure (gas, water, sewer or heating) project is to be developed. At the final examination, a student should demonstrate their professional and research skills according to the professional standard and State Regulation on Higher Level Professional Bachelor Education. Students should also demonstrate an ability to design building and urban engineering systems, perform thermal, hydraulic, aerodynamic and other necessary calculations, use modern materials, equipment and job-performance technologies, develop a project for the engineering system construction process, draw up a paper according to the requirements for qualifications papers, present it in public in front of the committee and defend the solutions stated in the project.

The procedure of Bachelor Paper development includes approval of the topic of the Bachelor Paper and the project with a scientific adviser and the head of the department. Students choose the fields of their Bachelor Papers from the sample topics suggested by each department; accordingly, the head of the department suggests an appropriate scientific adviser competent in the chosen theme of the Bachelor Paper.

A student and their scientific adviser also agree upon the calendar plan, but each department has its own control terms, taking into account that both autumn and the spring academic terms consist of 16 academic weeks. One of the examples of consulting and paper development: during week 3 of the academic term a student receives from a scientific adviser an approval concerning the engineering project part of the Bachelor Paper with the list of literature or the description of the Bachelor Paper structure on 1-2 pages. During week 8 of the academic term, the student receives from the scientific adviser an approval concerning the engineering design part of the designed project. But in week 12 of the academic term, the standard control must be carried out – prior to the examination date the completed engineering project must be sent to the head of the department or the assigned member of the academic staff. Before the engineering project is sent, it is necessary to show it to the scientific adviser and to receive their approval (signature on all drawings and the accompanying description part). Also, during week 12, a student should complete

the Bachelor Paper comprising literature review and setting the aim of the paper and subordinated tasks thereof (Bachelor Paper is ~50% ready), showing it to the scientific adviser. During week 16 of the academic term, the student must receive an approval from the scientific adviser about the developed Bachelor Paper. Accordingly, the scientific adviser, having signed the Bachelor Paper with the engineering project, informs the head of the department that they recommend the paper for the Viva Voce Examination. Viva Voce Examination is planned two times a year – at the beginning of June and at the end of November. Prior to Viva Voce, the paper is reviewed by the reviewers appointed by the head of the department. The Viva Voce Examination is public, it is evaluated by the State Final Examination Committee appointed by RTU Rector, which includes both academic personnel and representatives of professional civil engineering associations and companies.

The examples of the themes of Bachelor Papers over the last years are as follows:

- The Formation of Network Interconnection in Complicated Geological Conditions;
- Ventilation in Clean Rooms;
- Removal of Ammonia Nitrogen from the Filtrate in Waste Water Treatment Plants;
- Preparation and Distribution of Ventilating Air in Hospital Operating Rooms;
- Technical Security of Transmission Pipelines;
- Connection of District Heating to Buildings with a Low Temperature Heating System;
- Drainage of Rainwater in Urban Environment;
- Choosing Centrifugal Pumps for Heating, Water Supply and Sewer Systems of Family Houses;
- Impact of Hydraulic Balancing on the Efficiency of the Heating System.

Analysing the wide range of topics, it can be concluded that both teaching staff and students demonstrate their skills, knowledge and competences at a very high level and in line with the topicality of the field. The choice of topics is based on the student's interest in current developments in the field and on the student's preferences for future career choices, and the final thesis topics owe to the sustainability and development of the programme as a whole. During the reporting period, assessment of the graduate papers ranged from grade 5 to grade 10. In 2020, the programme was completed by 27 graduates with an average grade of 7.1, of them 3 graduates received grade 9, 8 graduates – grade 8, 13 graduates – grade 7, while 4 graduates – grade 6 and 3 graduates –grade 5. In 2019, 16 graduates with an average grade of 7.5 completed the programme: 3 graduates received grade 9, 4 graduates – grade 8, 7 graduates –grade 7 and 2 graduates – grade 6. In 2018, 21 graduates with an average grade of 7.5 completed the programme: 1 graduate received grade 10, 4 graduates – grade 9, 6 graduates – grade 8, 5 graduates – grade 7, while 3 graduates – grade 6 and 2 graduates –grade 5. In 2017, 22 graduates with an average grade of 7.8 completed the programme: 2 graduates received grade 10, 5 graduates – grade 9, 5 graduates –grade 8, 6 graduates – grade 7 and 4 graduates – grade 6.

3.3. Resources and Provision of the Study Programme

3.3.1. Assessment of the compliance of the resources and provision (study provision, scientific support (if applicable), informative provision (including libraries), material and technical provision, and financial provision) with the conditions for the implementation of the study programme and the learning outcomes to be achieved by providing the respective examples.

RTU Faculty of Civil Engineering (FCE) continuously monitors compliance to quality requirements of rooms and technical equipment, the appropriate lecture halls with necessary multimedia hardware have been equipped. In general, in the FCE building at 6A Ķīpsalas Street 4 computer rooms, 23 lecture rooms, 35 laboratory rooms are available for the needs of the study process. In order to ensure the qualitative study process, FCE is carrying out extensive refurbishment works, upon their completion the Faculty will meet international standards for campuses and lecture halls. Numerous new laboratories will be opened, which will promote development of the practical component of the study courses and introduction of technologies in the study process. The equipment in the existing premises is also continuously updated. Classification of the premises is given in the table below.

Room type	Number of rooms	Useful area m²
Meeting room	1	70.91
Computer rooms	4	243.77
Auditoriums	23	1702.34
Teachers' rooms, cabinets	69	1523.61
Assistant professor / Doctoral student premises	5	196.24
Workspace / workshop	6	172.19
Research facilities	6	350.53
Laboratories	35	1256.83
Resource room	6	213.53
Auxiliary room	11	197.99
Anteroom	3	35.89
Student self-government and record keeping	3	260.43
Kitchen	1	16.43
Total		**6240.69**

Of these, the following facilities shall be provided for the Institute of Heat, Gas and Water Technology:

Way of using premises	Number of premises	Useful area m ²
Laboratory – simulator	1	66.43
Laboratory – heating and renewable systems	1	68.05
Venting laboratory	2	70.3
Resource room/ doctoral candidate room	1	32.95
Employee room	6	95,04
Meeting room/on-line lecture room	1	32.61
Computer class/classroom	1	66.95
Laboratory – water system	1	70.91
Offices	1	15.67
Total		**337.29**

Lectures take place in the shared use lecture halls.

The study process will mainly be provided by the academic personnel and technical staff of the Institute of Heat, Gas and Water Technology of the Faculty of Civil Engineering, in cooperation with the following RTU organisational units:

- Department of Engineering Maths;
- Institute of Technical Physics;
- Department of Chemistry;
- Department of Labour and Civil Safety;
- Department of Innovation and Business Management;
- Department of Social Sciences;
- Department of Languages for Special Purposes.

Significant investment in study and research infrastructure was made between 2017 and 2020:

- multi-functional venting stand with the possibility to perform practical work in the field of balancing and automation, as well as testing the effects of different filters on pressure drop and electricity consumption;
- heating system stand with different system balancing capabilities;
- mobile power supply unit with solar panels and accumulators;
- small-sized climate chamber for analysis of phase change material parameters.

The Scientific Library of RTU (https://www.rtu.lv/en/studies/scientific-library) is an academic library of state significance, which has obtained its status as a result of library accreditation. The Scientific Library of RTU provides the necessary information for RTU study process and research activities, performs library, bibliographic and information services for RTU students, teaching staff, and employees. The Library's collection includes 1.4 million printed documents and e-resources in the databases relevant to RTU fields.

In 2016, significant investment was made in the development of the library infrastructure, with the construction of an additional 2240 m2 of space for the Central Library. The total area of the library premises is 6393 m2, of which 3417 m2 are for reader services. There are 713 workstations for library users. The library has four group rooms and six individual cubicles, a Western reading room and a conference room. The library is accessible to users with reduced mobility.

To improve the work of the Scientific Library of RTU and to ensure the availability of information needed for study and research work, the Library Council has been established, which decides on the replenishment of the library's collection with printed publications and subscriptions to the necessary databases. The Library Council has approved the "*RTU SL Collection Completion Policy*", which defines the basic principles of collection formation and development in accordance with the directions of RTU study and scientific activities.

When RTU provides funding for the library, the funding for information resources for each study programme is calculated. The collection is replenished according to the recommendations of the heads of study programme, researchers, and the allocated funding. The desired titles can be ordered by contacting the Library's Collection Development Department, ordering on the Library's website, filling in the order form, filling in the application form, by phone or by visiting the Library. The Scientific Library offers a guide to ordering titles and e-resources, which brings together the websites of various publishers and bookshops in Latvia and abroad.

Database subscription contracts are concluded both directly with the supplier and through the "Cultural Information Systems Centre" state agency, which is the Latvian national representative of the international non-profit organisation EIFL (Electronic Information for Libraries, http://www.eifl.net/). The EIFL Licensing Programme offers national libraries subscriptions to internationally recognised databases at significantly reduced subscription fees not offered to individual subscribers, thus saving financial resources of the libraries.

The database subscriptions maintained by RTU Scientific Library

(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.
- Databases financed by the Ministry of Education and Science available to RTU Scientific Library: ScienceDirect, SCOPUS (Elsevier), Web of Science.
- Latvian databases: LETA, Letonika, the Database of Latvian Standards (available on the premises of the Library).

Database usage at the Scientific Library of RTU has been growing since 2016. E-resource loans have increased from 75,391 to 525,194 items.

The new library premises have allowed to extend the range of services. Since the opening of the new premises in 2018, the number of visits to the library has increased from 103,825 to 235,600. The Scientific Library of RTU is open to everyone. The Central Library is open to users from Monday to Saturday. There is a 24/7 reading room. During the summer period, the Central Library is open every weekday with reduced opening hours. (https://www.rtu.lv/lv/studijas/biblioteka/pakalpojumi-3)(In Latvian)

The library's sources are housed in an open-access collection. Books and periodicals according to the field of study and the UDC indexes are located in the central building of the Scientific Library, 5 Paula Valdena Street, Riga. The last copies of the oldest publications corresponding to the RTU profile are kept in the library repository. They are always available to the users.

The librarian on duty helps visitors find their way around the collection. Bibliographers (information specialists) provide more detailed information and advice. The library has a branch librarian service. (https://www.rtu.lv/lv/studijas/biblioteka/nozaru-informacija). (In Latvian)

The library resource search is supported by the Primo Discovery search tool

(https://www.rtu.lv/lv/studijas/biblioteka/vienota-informacijas-meklesana) (In Latvian). It allows searching the library catalogue (https://kopkatalogs.lv/F/T38FF97LFP7SUY87KXUCN1BC8YYVQ9TQFBCLK51IKKGU27H2JJ-21914?func=option-update-lng&P_CON_LNG=ENG), the subscribed databases, as well as databases created by the RTU Scientific Library (https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/bibliotekas-veidotas-datubazes) (In Latvian) in one interface. Searching for information in the electronic joint catalogue (https://kopkatalogs.lv/F/T38FF97LFP7SUY87KXUCN1BC8YYVQ9TQFBCLK51IKKGU27H2JJ-23195?func=option-update-lng&P_CON_LNG=ENG), it is possible to simultaneously obtain information on the resources available in 12 Latvian libraries. Both the electronic catalogue and the RTU portal ORTUS allow remote reservation of library resources, as well as remote access to the databases. Since the introduction of RFID technology, users can use five self-service book-dispensing machines and check out books from the pick-up machines around the clock.

The library provides students, academic personnel and other stakeholders with various levels of individual consultations and group training in information literacy (https://www.rtu.lv/lv/studijas/biblioteka/lietotaju-apmacibas) (In Latvian).

Publications not available in the library are delivered via an interlibrary loan or an international loan.

Internet access is available throughout the library. The library has copying, scanning, printing, binding services and a self-service dining room.

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

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

The specific development of each study programme is the responsibility of each study programme director, as well as the faculty responsible. For the development of all study programmes, central funding is used for the renewal of the research library, improvement and maintenance of shared classrooms, public relations, programme marketing activities, development and maintenance of information systems related to the study process, development of the Ķīpsala complex and other activities.

Both state budget financing and student funds are used for the implementation of the programme.

Tuition fees are set in line with the National Audit Office's warning that tuition fees for students studying with budget students cannot be less than the public funding for this service. Part-time extramural studies do not receive State funding, so tuition fees are set taking into account a number of factors, such as the programme's ability to cover its costs, the market situation, demand for the programme, the stage of development of the programme, etc.

Information on the financial resources of the programme is presented below:

Academic year	Subsidy to the programme, EUR	Tuition fee for the programme, EUR	Total funding for the programme, EUR	Cost per student, EUR
2016/2017	237,988.37	114,401.67	352,390.04	3,866.02
2017/2018	258,676.78	109,713.25	368,390.03	4,040.66
2018/2019	269,516.80	118,176.96	387,693.76	4,229.68
2019/2020	289,633.13	99,248.18	388,881.31	4,405.04
2020./2021.	298 418,94	101 230,34	399 649,28	4 462,81

The analysis of the information shows that the state budget grants for the programme have increased during the reporting period. The cost per student has increased, which is justified by the overall increase in total RTU costs (utilities, building maintenance, etc.).

The calculation of costs includes such items as the salary of the teaching staff, the employer's mandatory state social insurance contributions per study place per year, business trip and business trip costs per study place per year, service costs per study place per year, which include communication service costs per study place per year, real estate tax on land per study place per year, repair costs per study place per year, maintenance costs per study place per year, provision of administrative work per study place per year as well as other services per study place per year per year; costs of materials, energy resources, water and inventory per one study place per year, which includes the costs of consumed electricity, heating, water supply, sewerage, purchase of teaching aids and materials per one study place per year, purchase of equipment per student per year, purchase of stationery per study place per year, purchase of books and magazines per student per year, purchase and modernization of equipment per study place per year, social security costs of the study place.

Funding received in 2020./2021. was EUR 4462.81 per bachelor's student. Which together amounts to EUR 1998.24 per credit score. The minimum required number of students for bachelor's studies - 11 th students per course or 55 th all together. However, in order to ensure the development of the programme and the growth of academic staff, the total number of studies should be at least 110 students.

The main conditions for development of the curriculum are modern technical equipment and staff growth. The overall budget of the study programme will make provision for around 10-15% of annual income. Funding is based on the maintenance of technical equipment and the participation of staff in conferences and the exchange of experience on trips. Basic equipment was purchased with ESF support and there is no need for replacement of essential equipment in the near future. However, today's calculation programs, sensors, etc. are purchased periodically.

Information on the minimum number of students in RTU study programmes is provided in the appendix of the self-evaluation report "On minimal number of students in study programmes".

Information on the funding distribution between the cost items is provided in the appendix of the self-assessment report "Funding distribution between the cost items".

3.4. Teaching Staff

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

The following qualitative and quantitative indicators show that the qualifications of the academic staff meet the requirements specified in Article 55 of the Law on Higher Education Institutions - 10 professors and 9 associate professors, approved by the Latvian Council of Science, have been elected to academic positions in RTU departments and are experts in their field, participate in the implementation of the compulsory and the compulsory elective part of the study programme.

Academic staff regularly improve their professional and academic knowledge by participating in methodological seminars, conferences (national and international), conducting scientific and research work, as well as by participating in various projects.

25 academic staff members of the **Institute of Heat, Gas and Water Technology**, of which **5** professors, **6** associate professors, **13** assistant professors and **1** lecturer, have been involved in the implementation of the study courses of the institute.

Academic staff of the Institute of Heat, Gas and Water Technology have multilateral knowledge and skills in both practical and scientific fields. Most of the acadenmic staff are certified specialists in the field of construction, this makes it possible to supplement the content of the study programme with practical materials, such as real projects. Part of the teaching staff works in leading energy and water supply companies, which allow training tours and practices. In addition, 40% of the teaching staff are experts of the Latvian Academy of Science, what certify the competence of the teaching staff in the latest scientific literature.

Professor, Dr.sc.ing. Anatolijs Borodiņecs obtained a Doctoral degree in engineering from Riga Technical University in 2007. Since 2013, he has been a Professor at the Institute of Heat, Gas and Water Technology, Riga Technical University. Borodiņecs is the author/co-author of 73 SCOPUS indexed publications, SCOPUS h-index is 9, Google Scholar h-index – 12. Scietific adviser of several theses for Doctoral, Master and Bachelor degrees. He is an expert of the Latvian Council of Science in Engineering and Technology – Construction and Transportation Engineering; Environmental Engineering and Power Engineering. He has a long-term experience in preparing and delivering lectures and training courses. The main research areas of Prof. Borodiņecs are energy efficiency and construction thermal physics. He is a participant and leader of several Latvian and international

projects. Major recent projects: H2020 Deep nZEB Modular Retrofitting and ERDF Energy-Efficient Solutions for Unclassified Buildings. He has recently participated in INTERREG, Seventh Framework Programme projects and Horizon 2020 projects. A. Borodiņecs has been awarded FULBRIGHT scholarship for research at the Indoor Environment Center of Department of Architecture Engineering, the State University of Pennsylvania. Since 2013, he has been reviewing articles in ELSEVIER journals and has been an editorial board member of the SCOPUS-indexed journals, as well as has been participating in industry-leading international conferences. Since 2015, A. Borodiņecs has been holding REHVA FELLOW status. He is also a board member of the Latvian Association of Heating, Ventilation and Air Conditioning Engineers and a member of ASHRAE. He is a certified HVAC designer as well as an energy auditor. He is a Deputy Chair of the Doctoral Council "RTU P-12".

Professor, Dr.sc.ing. Tālis Juhna obtained a Doctoral degree in engineering at Lulea Technical University, Sweden, in 2002. Since 2002, he has been a Professor of Riga Technical University and the head of study programmes. Since 2012, he has been Vice-Rector for Research at Riga Technical University. Member and founder of the Board of Conelum (2017). Member and Deputy Chair of the Council of Rīgas ūdens, Ltd. (2021). Head of the Advisory Board of the Latvian Council of Science (2021). Additional education: Cambridge, United Kingdom, drawing up of the European Union framework projects, financial aspects (2007). Riga Coaching School, Manager Leadership Courses (2020). Scientific research areas: ensuring water quality in the urban environment and generating energy from wastewater and renewable natural resources. He has established a Water Research Laboratory, which conducts research on drinking water purification, distribution systems, water quality and the formation of microorganism biofilm in the grid. He has developed an innovation implementation and deployment system at Riga Technical University, creating a variety of support mechanisms (e.g., RTU Design Factory) for development of new technologies. Head and member of the research programmes of the International and Latvian Council of Science, Ministry of Education and Science, etc. Published works: More than 100 scientific works in Latvian, Russian and English, including scientific monographs and patents, have been published. The author of several textbooks. Member of editorial boards of scientific journals and the author of more than 60 (cited>540 times, Scopus Hirsch Index 14) scientific articles published in journals and conference proceedings. Pedagogical work: supervised several Doctoral Theses, including those within a joint study programme with KTH; scientific consultant and scietific adviser of Doctoral Theses; has delivered study courses and has been the head of study programmes. Juhna is the Head of the Study Programme "Biotechnology and Bioengineering" jointly implemented by Riga Technical University and the University of Latvia. He has developed a number of courses to foster student innovation skills (e.g., Vertically Integrated Projects, Demola). Organisational work: He is the Vice-Rector for Research at RTU and supervises around 500 scientists at all institutes. He has introduced the funding distribution system of RTU. A member of the boards of several science centres, science councils and business incubators (e.g., the Green Technology Incubator). Currently, he is leading the COVID-19 liquidation project coordinating 9 scientific institutions (Latvian Institute of Organic Synthesis, Institute of Electronics and Computer Science (EDI), Institute of Solid State Physics of the University of Latvia (CFI), RTU, etc). Expert: He has worked as an expert on the evaluation of many projects (e.g., EU Framework Programmes) and as a consultant for the development of water engineering projects. Expert of the Latvian Council of Science: Engineering and Technology – Construction and Transportation Engineering. The Chair of the Doctoral Council "RTU P-12".

Professor, Dr.sc.ing. Arturs Lešinskis has researched the development of ventilation and air-conditioning systems of large public buildings, as well as a number of important building AVK projects have been developed and implemented under his leadership. A. Lešinskis is the Chairman of the Board at Laffivents Ltd., one of the leading microclimate and automated management solution companies in Latvia. A. Lešinskis has been elected Honorary Academician of the Latvian

Academy of Agricultural and Forestry Sciences, as well as Professor of Latvia University of Life Sciences and Technologies and RTU; hundreds of civil engineers have been trained under his leadership, Master and Doctoral Theses have been developed under his supervision. Professor of Riga Technical University and of Latvia University of Life Sciences and Technologies A. Lešinskis is socially active, has been a Chairman of the Board of Certification Centre of the Association of Heat, Gas and Water Technology Engineers of Latvia. A.Lešinskis' activities have been welcomed by a series of awards – Latvian Academy of Sciences (LAS); JSC Latvijas Gāze and RTU Development Fund Award for Lifetime Contribution to Science; Award for the Education and Training of Young Civil Engineers by the Latvian Association of Civil Engineers; Award for Lifetime Contribution to the Development of the Heat Technology Industry in Latvia by the Certification Centre of the Association of Heat, Gas and Water Technology Engineers of Latvia; Grand Award of the Construction Industry 2014 for Lifetime Contribution to the Construction Industry; as well as at the international level in 2015 the Federation of European Heating, Ventilation and Air Conditioning Association REHVA Professional Award in Recognition of Outstanding Achievements in Technology and for Contribution to Improve Energy Efficiency and the Indoor Environment of Buildings. A. Lešinskis is also a member of the Latvian Association of Heating, Ventilation and Air-Conditioning Engineers, Latvian Association of Civil Engineers and ASHRAE. He is a certified HVAC constructor and project expert of the State Construction Control Bureau (SCCB). Member of LAS Terminology Sub-Commission. Chairman of the State Examination Committee of the vocational higher education of the Faculty of Environment and Civil Engineering, Latvia University of Life Sciences and Technologies. In 2018, participated in an international HVAC expert working group in France to develop a standard for COPILOT Building Commissioning Solutions. 7 SCOPUS publications, SCOPUS h-index 1.

Professor, Dr.sc.ing. Romāns Neilands obtained a Doctoral degree in engineering in 2010 (Riga Technical University). During his study, Prof. Neilands studied not only waste water treatment, but also focused on hydraulics in treatment tanks, which was one of the key factors to ensure purification. Since 2015, he has been holding the position of Professor at the Institute of Heat, Gas and Water Technology, the Department of Water Engineering and Technology, RTU. The main areas of research are biological and physical-chemical processes for waste water treatment and their provision. Below, there are examples of research themes where Prof. Neilands has participated as a researcher: Hydraulic Modelling during Leaching for Engineering Structures; Creation of a Mass and Energy Database for Waste Water Treatment Plants (Excel, Access); Simulation of the Waste Water Treatment Process (StarPro, BioWin, Aquilfas – Models ASM and Bio_Denitro, Bio-P). While working at Riga Technical University, the Department of Water Engineering and Technology, Professor participated in the research programmes: RTU & LR Environmental Technology Competency Centre for modelling and research of the biological treatment of waste water of JSC Valmieras stikla šķiedra, JSC Grindeks. Over the past 15 years, he has developed his competence in the EU environmental and engineering legislation, established cooperation with consultancy companies from Plancenter, Poyry (Finland), Halcrow (the United Kingdom), Tauw (the Netherlands), Sweco (Sweden), BCEOM (France), as well as has been Deputy Head for Technological Affairs at Rīgas ūdens, Ltd. – in charge of Riga City waste water treatment process and the quality of the treated waste water in the biological treatment station "Daugavgrīva". Expert of Employers' Confederation of Latvia (LDDK): development of the Environmental Engineering Programme. Prof. Neilands is a co-author of 28 scientific publications, including 9 SCOPUS publications.

Associate Professor, Dr.sc.ing. Andris Krūmiņš obtained a Doctoral degree in engineering from Riga Technical University in 2009. Since 2017, he has been holding the position of Associate Professor at the Institute of Heat, Gas and Water Technology, RTU. The main areas of research are the energy efficiency of buildings, building management and automation systems, energy-efficient management of building engineering systems, energy monitoring and its importance. Has more

than 20 years of experience in the construction, building, servicing of control systems, automation and telemetry systems. Expert of the European Copilot Certification System for Building Automation Development Group. Scientific leader of the project “Improving the Energy Performance of Buildings, Supplementing the Artificial Intelligence of the Management Automation System with a Real-Time Simulation Environment and Self-Generating Algorithms” of Lafivents Ltd. carried out within the framework of the Transport Energy Competence Centre of the Smart Engineering Systems. A. Krūmiņš is also a member of the board of the Association of Heat, Gas and Water Technology Engineers of Latvia, a certified designer of electrical installations, a manager of construction works. 8 SCOPUS publications, SCOPUS h-index 2. The Grand Award of the Construction Industry 2014 to the Engineer of the Year.

Associate Professor, Dr.sc.ing. Jurģis Zemītis acquaired a Doctoral degree in engineering at Riga Technical University in 2015. He is currently an Associate Professor and Senior Researcher at the Institute of Heat, Gas and Water Technology, RTU. The main research areas: thermal physics, energy efficiency of buildings, HVAC systems and indoor air quality. He has been involved in projects such as: ENEF project - “Central Baltic Cooperation in Energy Efficiency & Feasibility in Urban Planning”; FP7 project – “Strategies towards Energy Performance and Urban Planning (STEP-UP)”; HORIZON2020 project: “Development and Advanced Prefabrication of Innovative, Multifunctional Building Envelope Element for MOdular REtrofitting and CONNECTions”; ERDF project “Nearly Zero Energy Solutions for Unclassified Buildings”. The expert of the Latvian Council of Science in Engineering and Technology – Construction and Transportation Engineering. J. Zemītis has more than fifteen years of practical experience in the design and energy efficiency assessment of HVAC and water supply and sewerage systems and project management. He has been certified for the design of water supply and sewer systems, including fire-fighting systems, as well as for the design of heating, ventilation, recovery and cooling systems. A member of the Association of Heat, Gas and Water Technology Engineers of Latvia since 2015. Received a REHVA award in 2017 as the best young scientist. In June 2015, the award “RTU Young Scientist of the Year” was granted by the Latvian Academy of Sciences, joint stock company “Latvijas Gāze” and RTU Development Fund. J. Zemītis is the author or co-author of more than 50 publications, 26 of which are indexed in the SCOPUS database. SCOPUS H-index is 5. He successfully completed a post-doctoral grant project. Regularly participates in various scientific and academic seminars/conferences to improve professional skills. He is a scientific adviser of graduate papers with an engineering project for the Master and Bachelor students.

Associate Professor, Dr.sc.ing. Linda Mežule. She is an Associate Professor at RTU and Senior Researcher at the Water Research and Environmental Biotechnology Laboratory; co-author of more than 40 international scientific publications in the environmental biotechnology, water engineering and microbiological quality assessment sectors. Since 2005, she has been actively involved in various international and local scientific projects. Currently, she is a scientific leader (project coordinator) of four projects (two ERDF practical research projects, EANET EU-LAC, the Latvian Council of Science

Programme for Fundamental and Applied Studies) related to the development of new technologies for resource redeployment and environmental biotechnologies. She is a scientific adviser of Bachelor, Master and Doctoral Theses of students from natural sciences, environmental sciences and engineering industries. In 2017, she received the award of RTU Young Scientist of the Year. She is a co-founder of biotech company Conelum. SCOPUS h-index 7. She is an expert of the Latvian Council of Science: Engineering and Technology – Environmental Biotechnologies.

Associate Professor, Dr.sc.ing. Kristīna Kokina is the Head of the Department of Water Engineering and Technology. In 2000, she obtained a Master degree in chemistry from the University of Latvia and in 2011 – a Doctoral degree in engineering at Riga Technical University.

Since 2015, she has been holding the position of Associate Professor at the Institute of Heat, Gas and Water Technologies, RTU. She is also a Senior Researcher at the Water Research and Environmental Biotechnology Laboratory. Her main areas of research are water and wastewater treatment technologies. Recent projects are related to demonstrating technologies for waste water treatment: INTERREG Baltic Sea Region International Cooperation Programme BEST, # R054; WATERCHAIN, CB50; project for groundwater purification "Mobile Biofiltration Technology" by the Latvian Council of Science, as well as project COV-MITIGATE funded by the State Research Programme for Covid-19 mitigation. Kristīna Kokina is also the Head of the Laboratory of Chemistry Elemental Analysis Group at the Institute of Food Safety, Animal Health and Environment "BIOR"; technical expert in water and sewage quality and technology at the Latvian National Accreditation Bureau (LATAK), and expert of the Latvian Council of Science in Engineering, Technology –Construction and Transportation Engineering. 20 SCOPUS publications (Scopus ID 26031824500), SCOPUS h-index 4. She is a member of the Doctoral Council "RTU P-12".

Associate Professor, Dr.sc. ing. Jānis Rubulis obtained a Doctoral degree in gas and water engineering in 2007. Since 2015, J. Rubulis has been holding the position of Associate Professor and Senior Researcher in Construction and Transporatation Engineering (heat, gas and water engineering systems) at the Department of Water Engineering and Technology. In addition to these positions, J. Rubulis is also the Head of the Institute of Water Systems and Biotechnology and a Manager of several international projects: Water Technology Innovation Roadmaps – iWatermap, Pilot Platform of Vocational Excellence Water – Pilot PoVE Water, Protecting the Baltic Sea from Untreated Wastewater Spillages during Flood Events in Urban Areas – NOAH. He has developed and has been delivering study courses "Risk Analysis of Water Resources", "Architecture and Construction," "Scientific Methodology for Building Systems". Experience as an academic adviser of graduate papers in a variety of themes, such as "Reduction of Turbidity by Flushing Drinking Water Networks" and "Recovery of Phosphorous from Wastewater". He is the author of scientific articles published in Web of Science and Scopus databases, conference proceedings and scientific journals. Co-author of the patent "Method of Anaerobic Digestation of Acidic Whey in a Four-Chamber System".

Assistant Professor, Dr.sc.ing. Inara Laube obtained a Doctoral degree in engineering from Riga Technical University in 2013. Since 2014, she has been an Assistant Professor at the Institute of Heat, Gas and Water Technology, RTU. The main areas of research are the planning of the gas supply system, the importance of the criteria for selecting parameters for the hydraulic calculation of gas pipelines for the construction of a new distribution and user gas supply system. Since 2012 she has been involved in pedagogical activities – delivers lectures, supervises study projects, administers the examination for the 4th-year Bachelor students of RTU External and Part-Time Studies Department. She has been scientific adviser of 9 Master Theses and 3 Bachelor Papers over the past 5 years. She delivers lectures on the legislative framework for construction and industry to the specialists in the natural gas supply sector (designers, construction professionals, building supervisors) at the Training Centre of JSC Gaso. Since 2019, I. Laube is an expert of the Certification Centre of the Association of Heat, Gas and Water Technology Engineers of Latvia. Since 1980, under the supervision of I. Laube, gas supply plans for new areas have been developed – schemes and building projects for new connection solutions. She is a certified building specialist in the field of distribution and user systems design (with a pressure not exceeding 1.6 MPa). She has participated in a number of scientific conferences, presenting the results of research. The author of publications, including SCOPUS indexed articles. Since 2014, she has been delegated by the Association of Heat, Gas and Water Technology Engineers of Latvia to work at the Construction Council of Latvia (member), which evaluates and draws up proposals for the construction regulation and industry development. Since 2006, she has been the chair/member of the Cooperation Council of Engineering Network Operators. I. Laube has received the Award for the Lifetime Contribution to

the Development of Engineering Networks by the Association of Heat, Gas and Water Technology Engineers of Latvia, the REHVA Professional Award, Certificate of Merit for Winning the Competition of Gas Technologies and Scientific Works within the Target Programme for Education, Science and Culture.

Assistant Professor, Dr.sc.ing. Lana Migla obtained a Doctoral degree in engineering from Riga Technical University in 2013. She received the Annual Prize for the Young Scientist in Power Engineering from the Latvian Academy of Sciences. She has worked for 8 years at the Laboratory of Energy Resources of the Institute of Physical Energetics, where she carried out research in the field of power engineering within various international scientific projects and research contract work of public authorities. The main research areas of Lana Migla are alternative energy sources, particularly solar energy, and heating. She has been elected a Researcher at the Institute of Heat, Gas and Water Technology since 2017. A number of Bachelor and Master Theses have been developed under her guidance. In 2019, she participated in training in Greece within the ERASMUS+ programme. Lana Migla has currently received support for post-doctoral research "Latent Heat Storage for Sustainable Operation of the Cooling System". Lana Migla is a co-author of 44 scientific publications, including 17 SCOPUS publications, SCOPUS h-index 2.

Assistant Professor, Dr.sc.ing. Jeļena Tihana obtained a Doctoral degree in engineering from Riga Technical University in 2013. At present, she holds the positions of Senior Researcher and Lecturer at the Institute of Heat, Gas and Water Technology, RTU. Jeļena Tihana is currently implementing a post-doctoral research project "Efficiency of Gas Hybrid Equipment in the Climatic Conditions of Latvia". She has participated in the ESF projects "Development, Optimisation and Sustainability Research of Smart Solutions for Nearly Zero Energy Buildings in Real Climate Conditions" as a Researcher and in the project "Strengthening the Academic Staff of Riga Technical University in Areas of Strategic Specialisation" as a Coordinator. Jeļena Tihana is a certified natural gas designer and implements gas systems projects. Tihana's field of research is the development of gas systems and the possibility of using gas in combination with renewable resources. 7 SCOPUS publications, SCOPUS h-index 2.

Assistant Professor, Dr.sc.ing. Aleksandrs Zajacs obtained a Doctoral degree in engineering from Riga Technical University in 2017. In the period from 2011 to 2019, A. Zajacs worked at JSC "Rīgas Siltums", the Baltic largest district heating company. Since 2019, he has been holding the position of Senior Researcher at the Institute of Heat, Gas and Water Technology, RTU. Key research interests include evaluating scenarios for the development of district heating systems, combining renewable and fossil energy sources in the most efficient way, as well as energy efficiency issues in the district heating and housing sector. A. Zajacs is the author of more than 20 scientific articles, of which 11 published in SCOPUS database, SCOPUS h-index 4. He has gained international research experience while studying at the exchange programme of the Danish Technical University (DTU) and participating in the implementation of the EU Seventh Framework Programme, as well as Horizon 2020 projects: "Strategies towards Energy Performance and Urban Planning" (STEP-UP) and "European Research Infrastructure for Thermo-Chemical Bioomass Conversion" (BRISK) and "Nearly Zero Energy Solutions for Unclassified Buildings". In 2018, A. Zajacs received the REHVA Young Scientists Award in academic year 2017/2018 and in 2018 - the award "Young Scientist of the Year" by JSC Latvijas Gāze and RTU Development Fund. A post-doctoral research project is currently being carried out. He is an expert of the Latvian Council of Science: Engineering and Technology – Construction and Transportation Engineering.

Assistant Professor, Dr.sc.ing. Ināra Škapare. Her main areas of research are renewable energy sources, including geothermal energy. In the field of practical design, several heating, ventilation and air-conditioning construction projects, as well as water and sewer construction projects, have been developed under the guidance of I. Škapare. Since 1999, work has been carried

out in the field of energy efficiency. Since 2003, I. Škapare has been a memeber of the Association of Heat, Gas and Water Technology Engineers of Latvia; she is a certified specialist of heating, ventilation and air-conditioning systems, water supply and sewer systems, including fire-fighting systems, as well as the energy certification of buildings. I. Škapare has participated in a number of scientific conferences with presentations of the research results. Since 2004, she has been performing pedagogical work at the Institute of Heat, Gas and Water Technology. Several Bachelor and Master Theses have been developed under her supervision. I. Škapare has received REHVA professional award in design.

Assistant Professor Inna Šaraņina has been a member of the Latvian Association of Refrigeration Engineers since 1998 and since 2006 has also been a board member of the Association. She participates in the process of drawing up the Cabinet of Ministers regulations for the refrigeration sector. In 2005, she established the Certification Centre of the Latvian Association of Refregeration Engineers. She is the Head of the Centre. Since 2007, Inna has organised and chaired professional conferences in the field of refrigeration appliances. In the field of practical design, a number of building projects for refrigeration systems have been developed under the control of Šaraņina. In the field of pedagogy, she has been working since 1987. 33 years of work experience are related to practical work at special and general education institutions. . Šaraņina has developed and co-ordinated the 10th study programme of the Ministry of Education and Science, further education and vocational development programmes, many of which are currently being implemented at various educational institutions. Since 2015, I. Šaraņina has been performing pedagogical work at the Institute of Heat, Gas and Water Technology, RTU. Since 2017, she has been leading the development of training and methodological materials within the projects of the ESF and the National Centre for Education. In 2018, she participated in the expert working group on the standard development of “Refrigeration Equipment”. She also participated in training in Germany within ERASMUS+ programme in 2019. She worked as a Project Manager within the EU fund implementation.

Assistant Professor, Dr.sc.ing. Uģis Osis obtained a Doctoral degree in heat, gas and water engineering from Riga Technical University in 2005. U. Osis holds the position of Board Member at JSC Rīgas Siltums, the Baltic largest heating company. He is responsible for the technical policy of the company. Since 2009, U. Osis has been actively participating in the Council of the Latvian Association of Heating Companies with a view to developing district heating and cogeneration – introducing the most advanced experience, modern energy-efficient techniques, maximising the use of local fuels, participating in the drafting of development plans for heating, legislation and regulatory enactments. Since 2004, he has been working as a Lecturer at Riga Technical University. He delivers the professional study course “District Heating” at the postgraduate level and supervises the development of Master, Bachelor and Qualification Papers. He is a member of the organisational committee of the annual international scientific conference of JSC Rīgas Siltums. Co-author of a number of scientific publications in the field of heating, has experience working within the projects for the conversion, renewal and innovation of heating systems at both Latvian and international level. He has obtained a number of operating practice certificates in the field of heating, as well as additional training, by attending seminars and courses in the fields of power engineering and personnel management, participates in the working groups and provides advice on energy issues at both the Latvian and international level. In 2019, he took part in the EU and US expert conference on an action plan in the fuel and energy sector for providing the heating season in Ukraine.

Assistant Professor, Dr.sc.ing. Kristina Ļebedeva obtained a Doctoral degree in engineering from RTU in 2008. K. Ļebedeva gained great experience in the fields of renewable energy use and energy efficiency by working for 19 years at the Laboratory of Energy Resources of the Institute of

Physical Energetics. K. Ļebedeva participated in many Latvian (National research programmes, Latvian Council of Science, etc.), European (ESF, EFAR, FP6 and FP7, IEE) and international (Era-Net-Lac) scientific projects as a scientific adviser, senior researcher, researcher and administrative manager. K. Ļebedeva was responsible for implementing the first significant solar energy use projects in Latvia. Working at the Laboratory of Energy Resources of the Institute of Physical Energetics, she participated in the development of testing ground for solar energy exploration. Since February 2020, she has been working at the Department of Heat Engineering and Technology of the Institute of Heat, Gas and Water Techology, the Faculty of Civil Engineering carrying out research on the practical integration of renewable energy resources into HVAC systems and energy supply systems. K. Ļebedeva actively participates in the research activities of the Faculty of Civil Engineering, RTU: draws up scientific project applications, publishes scientific papers, participates in student training (supervising and reviewing Bachelor, Master and Doctor Theses). In 2012, she received a grant by UNESCO and Peoples' Friendship University of Russia: energy management at international level, sustainable energy development, energy services and renewables. In 2006, she was awarded the annual prize of Latvenergo and the Latvian Academy of Sciences for achievements in power engineering. She regularly reviews Doctoral Theses for the State Scientific Qualification Commission. She has participated in many international conferences, congresses and symposia. 76 scientific publications (25 SCOPUS). SCOPUS h-index 3, Google Scholar h-index - 5, 1 Latvian patent.

She is an expert of the Latvian Council of Science in Engineering and Technology – Environmental Engineering and Power Engineering. Member of the Doctoral Council "RTU P-12".

Assistant Professor, Dr.sc.ing. Oskars Lauva obtained a Doctoral degree in engineering from RTU in 2016. Since 2018, he has been working as an Assistant Professor at the Department of Water Engineering and Technology, delivering the course "Pumps, Fans, Compressors". O. Lauva has supervised 2 Bachelor Papers and 1 Master Thesis. He is a certified designer of HVAC and water pipes and sewage systems.

Assistant Professor, Dr.sc.ing. Sandis Dejus obtained a Doctoral degree in engineering from RTU in 2019. Currently he holds the position of Senior Researcher at the Water Research and Environmental Biotechnology Laboratory of RTU and the position of Assistant Professor at the Department of Water Engineering and Technology of RTU. The core topics of S. Dejus research relate to the quality of drinking water, its changes and monitoring, but he is also active in research on other topics relevant to the water industry. Sandis Dejus has experience in managing commercialisation and research projects, in the past leading the National Research Programme Project SOPHIS sub-activities at RTU, as well as in the ongoing implementation of the commercialisation project "Online Drinking Water Quality Monitoring and Early Warning System WATSON". In addition, Sandis has participated and has been participating in the projects of FP6, FP7, ERDF, INTERREG, ERASMUS+, TNP, LIFE and other scientific programmes. In 2018, S. Dejus participated in the ERASMUS+ programme making an experience exchange visit to South Africa.

Sandis Dejus is the Executive Director of the Latvian Water and Wastewater Works Association, member of the Council of Industry Experts of the Employers' Confederation of Latvia (Chemical Industry and allied industries (Chemistry, Pharmaceuticals, Biotechnology, Environment)), as well as one of the most active employees of RTU in the field of public education, continuously running workshops and lecture cycles on drinking water use habits. S. Dejus is a co-author of 13 scientific publications, including 5 indexed in the SCOPUS database. SCOPUS h-index is 2.

Assistant Professor, M.sc.ing. Guntis Klīve obtained a Master degree in engineering from Riga Technical University in 1994. Since 2016, he has been working as an Assistant Professor at the Department of Water Engineering and Technology.

He is a certified designer of HVAC and water pipes and sewage systems as well as the Technical Director of Jūrmalas ūdens Ltd.

Assistant Professor, Dr.sc. ing. Roberts Neilands obtained a Doctoral degree in engineering from Riga Technical University in 2004. Since 2010, he has held the position of Assistant Professor; since 2013, he has been holding the position of Associate Professor at the Institute of Heat, Gas and Water Technology, RTU. The main areas of research are runoff at buildings, as well as issues related to water supply and sewerage. He participates in a number of scientific conferences, presenting the results of research. Since 2007, R. Neilands has been involved in pedagogical work at the Institute of Heat, Gas and Water Technology. Under his supervision, a number of Bachelor and Master Theses in the fields of water supply and sewerage have been developed. R. Neilands holds certificates in design of water supply and sewer systems, including fire-fighting systems. In the field of practical design, building projects for water supply and sewerage systems have been developed under supervision of R. Neilands.

Assistant Professor, Dr.sc.ing. Kamila Gruškeviča obtained a Doctoral degree in engineering from Riga Technical University in 2015. K. Gruškeviča has received the annual award of the Federation of European Heating, Ventilating and Air Conditioning Associations (REHVA) for her Doctoral Thesis “Cleaning Water Supply Systems after Deliberate Pollution”. Since 2008, she has been working at the Department of Water Engineering and Technology. The main research areas of K. Gruškeviča are the process of preparation of drinking water and the cleaning of systems after standard operation or various pollution sources. Since 2008, she has also been working at the Water Research and Environmental Biotechnology Laboratory. 8 SCOPUS publications, SCOPUS h-index 3, Google Scholar h-index -12.

Lecturer, M.sc.ing. Marīte Bižāne obtained a Master degree in engineering from Riga Technical University in 2016. She is currently a Lecturer at the Institute of Heat, Gas and Water Technology, RTU. Main research areas: fire-fighting systems, water hydraulics. M. Bižāne delivers lectures on fluid mechanics, hydrodynamics and aerodynamics. Several Bachelor Papers on water and sewerage issues have been developed and defended under her supervision. In addition, she delivers lectures at the Fire Safety and Civil Protection College. In 2019, M. Bižāne participated in the Committee LVS/STK 24 of the Latvian National Standardisation Institution, during which LVS 187:2020 has been developed. The Doctoral Thesis is currently being developed under the supervision of Prof. B. Gjunsburg. 4 SCOPUS publications, SCOPUS h-index 1.

Guest Professor Primal Fernando of the Mechanical Engineering Department of the Faculty of Civil Engineering, University of Peradeniya, Sri Lanka. For more than 10 years, Primal Fernando has been delivering such courses as “Thermodynamics”, “Mechanics”, “Refrigeration Equipment” and “Power Technologies”. He obtained a Doctoral degree in the field of applied thermodynamics and refrigeration equipment engineering at the Swedish Royal Institute of Technology (KTH), while the postdoctoral position was at the State University of Florida (FSU) in the USA. Prof. Fernando was involved as a Guest Professor. He will supplement training materials within the study courses “Cooling and Refrigeration”, “Industrial Refrigeration Systems and Freezers” and “Alternative Energy for Building Heat Supply”.

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

10 professors – Doctors of Science, whose scientific and academic qualifications corresponds to the

regulations on the criteria for the election in the professor position, are involved in the implementation of the study programme.

9 elected associate professors – Doctors of Science, whose scientific and academic qualifications corresponds to the regulations on the criteria for the election in the position of an associate professor, are involved in the implementation of the study programme.

Furthermore, 19 assistant professors, 3 lecturers, and 1 assistants are involved in the implementation of the study programme.

The changes in the reporting period are significant, in total 2 associate professors, 1 lecturer and 1 assistant joined the programme.

Analysis showed that this happened for a variety of reasons:

1. The associate professors and assistant professors advanced their qualifications over the reporting period and became professors or associate professors, respectively;
2. The academic staff took part in grant competitions, and received funds and opportunities to conduct the research in the field, thus changing their academic position to a researcher and leading researcher position;
3. New industry specialists were recruited to promote introduction of advanced technologies in the study courses; thus, lecturers and assistants came to work in the programme.
4. Retirement;
5. Termination of employment due to commencing work in the construction sector that offers a significantly higher salary has occurred less frequently.

In general, changes in composition have contributed to a reduction in the average age of teaching staff. There is a tendency for the young teaching staff to become graduates of the doctoral programme, which makes it possible to improve the educational material with the latest scientific developments that young teaching staff have studied in their promotion activities. New teaching staff are active in the areas of capacity building and mobility, which facilitates the exchange of experience and enables the content of study programmes to be improved.

The overall changes during the reporting are given in the table:

Academic position	Academic year 2016/17	Academic year 2020/21
Professor	8	10
Associate professor	8	9
Assistant professor	13	19
Lecturer	0	3
Assistant	0	1

The table shows that the programme involves new qualified members of the academic staff, thus maximally adjusting the programme curriculum to the specifics and latest development in the sector. In order to encourage staff renewal, senior and Master students are involved in the study process. Part of them continue to work in scientific projects and, with time, start to develop their academic careers.

Currently, RTU is implementing SAM 8.2.2 project on "Strengthening of Academic Personnel of Riga

Technical University in Strategic Specialisation Areas" financed by the European Social Fund, one of the tasks of which is the renewal of academic personnel. The aim of the project is to strengthen RTU academic personnel in the areas of strategic specialisation in 10 study fields, including the study field "Architecture and Civil Engineering". The project activities are focused on three areas:

- Involvement of Doctoral students in the work of the academic staff at RTU,
- Involvement of foreign academic staff in the work of the academic staff at RTU,
- Improvement of the existing academic staff qualifications, including academic staff internship at an economic operator.

Within the project, academic staff have an opportunity to develop their competence at the courses in professional English, as well as specialized training courses.

In order to ensure and increase the impact of scientific activities and personnel development, RTU management signs an annual agreement with each RTU faculty, which sets specific quantitative indicators in the areas of studies, scientific activities and valorisation.

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

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

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

In the process of study programme implementation, close cooperation of academic staff takes

place, which is also manifested in the following activities:

- Discussion of the results and quality of the reviews at the department meeting, discussing the evaluation criteria and ways to improve the quality of the graduate papers.
- Interconnection of lectures and practical classes, discussion of strengths and weaknesses afterwards.
- Joint attendance of methodological seminars, which are held in an interactive way, where academic staff share their experience and discuss the latest scientific and professional trends, as well as psychological and pedagogical techniques and methods for improving the study process.
- Cooperation within the projects, where the experience gained is used by the academic staff in the study process.
- Joint study tours, where academic staff and students learn about current developments in the field and apply practical case studies in classroom sessions.

The student-faculty ratio at the study programme at the time of submission of the self-evaluation report is 362/48 or one member of the academic staff to 7.5 students.

Annexes

III - Description of the Study Programme - 3.1. Indicators Describing the Study Programme		
Sample of the diploma and its supplement to be issued for completing the study programme	diploms ar pielikumu.rar	diploms ar pielikumu.rar
For academic study programmes - Opinion of the Council of Higher Education in accordance with Section 55, Paragraph two of the Law on Higher Education Institutions (if applicable)		
Compliance of the joint study programme with the provisions of the Law on Higher Education Institutions (table) (if applicable)		
Statistics on the students in the reporting period	RBSCO_5.annex ENG.docx	RBSCO_5.pielikums LV.docx
III - Description of the Study Programme - 3.2. The Content of Studies and Implementation Thereof		
Compliance with the study programme with the State Education Standard	6. annex RBCSO ENG.docx	6. pielikums RBCSO.docx
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard or the requirements for professional qualification (if applicable)	RBSCO 7. annex_en.docx	RBSCO7. pielikums LV.docx
Compliance of the study programme with the specific regulatory framework applicable to the relevant field (if applicable)		
Mapping of the study courses/ modules for the achievement of the learning outcomes of the study programme	RBSCO 8. annex ENG.xlsx	RBSCO 8. pielikums LV.xlsx
The curriculum of the study programme (for each type and form of the implementation of the study programme)	9. pielikums Bak. ENG.rar	9. pielikums Bak.rar
Descriptions of the study courses/ modules	RBSCO ENG.rar	RBSCO LV.rar
Description of the organisation of the internship of the students (if applicable)	Internship_Management_Procedure.pdf	Prakses_organizesanas_kartiba.pdf
III - Description of the Study Programme - 3.4. Teaching Staff		
Confirmation that the academic staff of the doctoral study programme includes not less than five doctors, of which at least three are experts approved by the Latvian Council of Science in the branch or sub-branch of science in which the study programme intends to award a scientific degree (if applicable)		
Confirmation that the academic staff of the academic study programme complies with the requirements specified in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions (if applicable)		

Civil Engineering (51582)

Study field	*Architecture and Construction*
ProcedureStudyProgram.Name	*Civil Engineering*
Education classification code	*51582*
Type of the study programme	*Doctoral study programme*
Name of the study programme director	*Juris*
Surname of the study programme director	*Smirnovs*
E-mail of the study programme director	*juris.smirnovs@rtu.lv*
Title of the study programme director	*Profesors/ Dr.sc.ing.*
Phone of the study programme director	
Goal of the study programme	*The aim of study programme is preparation of highly qualified specialists for research activities, preparation of academic staff for teaching at university level in the area of civil engineering and preparation of scientists for independent undertaking and supervision of research projects.*
Tasks of the study programme	*1) Gain mastery of scientific research methods;* *2) Complete a promotional paper (dissertation);* *3) Publish articles in quotable sources and deliver research results in scientific conferences.*
Results of the study programme	*Doctoral studies are intended to complement knowledge, skills and abilities gained in the previous level studies to independant research work in civil engineering, as well as to prepare for independent research and teaching activities. Defended doctoral thesis. Ability to perform independent scientific research work.*
Final examination upon the completion of the study programme	*The final examination is presentation of thesis (dissertation). The doctoral degree is awarded for independent promotional work (thesis), which contains original approved research results and provides new findings in chosen scientific field.*

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)	*professional master degree in transportation engineering, or professional master degree in civil engineering, or comparable education*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Doctor of Science (Ph.D.) in Civil and Transport 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 - 4 years - english

Study type and form	*Full time studies*
Duration in full years	*4*
Duration in month	*0*
Language	*english*
Amount (CP)	*192*
Admission requirements (in English)	*professional master degree in transportation engineering, or professional master degree in civil engineering, or comparable education English language proficiency level B2*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Doctor of Science (Ph.D.) in Civil and Transport 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

3.1. Indicators Describing the Study Programme

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

Doctoral study programme "Civil Engineering", classification code 51582; licence No 04051-44; approved at the meeting of RTU Senate on 25 March, 1996, Minutes No 410. The updated study programme was approved at the meeting of RTU Senate on 26 March, 2001, Minutes No 457; at the meeting on 2 June, 2003, Minutes No 478, at the meeting on 28 June, 2004, Minutes No 488, and accredited by the decision of the Study Accreditation Commission of the LR Ministry of Education and Science of 29 May, 2017.

Profile	Civil Engineering
Level of studies	Academic doctoral studies
Programme code	RBDB0
Duration of studies	4 years (8 terms)
Volume of studies	192 credit points (288 ECTS)
Previous education	Master degree or equivalent education
Degree to be awarded	PhD

The title of the awarded degree was changed during the reporting period. Amendments to the Cabinet regulations No.1001 of 27 December, 2005 "The Procedure and Criteria for Awarding of a Doctoral Degree" stipulate that "The degrees with the titles specified in the decision on accreditation of relevant Doctoral programmes before 17 August 2018" can be awarded until 31 December 2019." (Clause 41). From 1 January 2020 the awarded academic degree is PhD".

RTU submitted an application to the Academic Information Centre with the request to update the accreditation fact sheet for the field of study, having specified the awarded academic degree of PhD as the main amendment and the relevant field(s) of study in the study programme, according to the Cabinet regulations No.49 of 23 January 2018 "Guidelines on the Latvian Scientific Fields and Sub-fields", as well as an application to the Latvian Council of Science on granting authority for awarding PhD degrees to RTU in the corresponding academic fields.

On 4 May 2020, the decision of the Latvian Council of Science was received, where the Council approved the RTU application for granting degree awarding authority in such fields of study as civil engineering and transport engineering, music, visual art and architecture, environmental and power engineering, environmental biotechnology, as well as the appropriate amendments to the Cabinet regulations of 27.12.2005 "Guidelines on granting authority to award PhD degrees to higher educational establishments".

On 6 May 2020, RTU received the decision of the Higher Education Quality Commission No. 2020/21-I of 30 April 2020 on amendments to the accreditation data sheets for the field of study “Architecture and Civil Engineering”.

During the reporting period, the following studying courses were deleted from the compulsory elective course list: Digital Cartography (special course), Real Estate Management (special course).

Implementation of the study programme occurs only on full-time basis (4 years). The study programme is implemented in Riga in Latvian and English.

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

The PhD study programme “Civil Engineering” is implemented according to the Law on Higher Educational Establishments of 2 November 1995, the Law on Scientific Activity of 19 May 2005, and the Law on Education of 29 October 1998, as well as in accordance with the Cabinet Regulations No.1001 "On the Procedure and Criteria for Awarding Doctoral Scientific Degree” of 27 December 2005, RTU Constitution, RTU Senate decisions and RTU regulations on the Doctoral studies.

In the course of studies, *the quality of learning outcomes is provided by the system of cross-compliance of the enrolment requirements with the study aims and tasks*, the general principles are defined in RTU Regulation on Doctoral Studies https://www.rtu.lv/en/studies/doctoral-studies . Throughout the PhD studies, students acquire competencies and research techniques, conduct scientific research of certain issues and give scientifically substantiated recommendations for various building construction fields concerning both opportunities offered by new technologies, and advantages of new construction materials and other recommendations.

The programme corresponds to the Guidelines for development of education in 2021-2027 “Future skills in the future society (https://likumi.lv/ta/id/324332 "in Latvian”) and highly qualified academic staff and scientists in Civil Engineering are educated and trained in the course of their implementation. Doctoral programmes are improved according to the requirements of the European Framework for Qualifications, the Bologna process, and other regulations.

To enrol in a PhD programme, it is necessary to graduate successfully RTU Master studies in Civil Engineering or professional Master studies in Civil or Transportation Engineering, or other compatible study programmes, which would be accepted by the Council of the Faculty of Civil Engineering.

Aims	The aim of study programme is preparation of highly qualified specialists for research activities, preparation of academic staff for teaching at university level in the area of civil engineering and preparation of scientists for independent undertaking and supervision of research projects
Tasks	1) Gain mastery of scientific research methods; 2) Complete a promotional paper (dissertation); 3) Publish articles in quotable sources and deliver research results in scientific conferences.

Learning outcomes	Doctoral studies are intended to complement knowledge, skills and abilities gained in the previous level studies to independant research work in civil engineering, as well as to prepare for independent research and teaching activities. Defended doctoral thesis. Ability to perform independent scientific research work.

Having mastered the study programme, the alumni (learning outcomes):

- are able to demonstrate that they have developed knowledge and understanding of the most recent scientific theories and advances, master research methodology and modern research techniques in Civil Engineering and related cross-disciplinary fields;
- are able to independently assess and choose an appropriate research methodology and have contributed into extension of knowledge frontiers or given a new interpretation of the existing knowledge and its practical application, having carried out significant original research, with part of which is at the internationally cited publication level;
- are able to find solutions to global research or innovation challenges through independent, critical analysis, synthesis and evaluation;
- are able to independently put forward a research idea, plan, structure and manage large-scale research projects, including international ones;
- are able to communicate both orally and in writing about their field of research in terms of the relevant sector with a wider scientific community and public in general;
- are able to take responsibility for ethical aspects of their research activities;
- are able to raise independently their academic qualifications;
- are able to implement research projects, resulting in scientific achievements that meet international criteria for the field of research;
- are able to manage research or development tasks at the companies, institutions and organizations requiring comprehensive knowledge and know-how in research;

The aims, tasks and learning outcomes of the PhD programme “Civil Engineering” are interlinked and their reachability is very high.

The programme activities support putting into practice the motto of Riga Technical University (RTU) Strategy for 2021-2025:” *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 educates and trains European and global-level engineers – leaders: developers of new technologies.”* (https://www.rtu.lv/en/university/strategy).

The study programme fully complies with the development aim of RTU Faculty of Civil Engineering – to become an internationally recognized leading Latvian educational, research and development institution in the field of civil engineering, providing high quality study process, internationally recognized research and sustainable innovation, commercialization and knowledge transfer for economic development.

Program code 51582 complies with the regulations of the Cabinet of Ministers No. 322 Regulations on the Classification of Education in Latvia. The first and second classification levels, denoted by the first two digits of code 51, are Doctoral studies (doctoral degrees), to be implemented after obtaining a master's or professional master's degree or as a continuation of an education program with code 49. Duration of full-time studies is three to four years. The third, fourth and fifth levels of classification (education thematic groups, thematic areas and program groups), denoted by the next three digits 582 are Civil Engineering (58 denotes Architecture and Civil Engineering)

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

The PhD study programme “Civil Engineering” is implemented according to the Law on Higher Educational Establishments of 2 November 1995, the Law on Scientific Activity of 19 May 2005, and the Law on Education of 29 October 1998, as well as in accordance with the Cabinet Regulations No.1001 "On the Procedure and Criteria for Awarding Doctoral Scientific Degree” of 27 December 2005, RTU Constitution, RTU Senate decisions and RTU regulations on the Doctoral studies.

The economic and social substantiation of the study program is based on performed industry surveys, which are regularly performed on annual basis by the Ministry of Economics, and it is aimed at following up the development trends of the civil engineering field, including fluctuations in the increase of the construction and the indices of increase of the construction costs, in order to identify factors hindering development of the industry and eventual overheating risks in a timely manner, as well as forecasting the production scope and costs in the next years by applying forecasting methods. The survey reveals that during the whole period from 2020 to 2024 the experts and combined forecasts predict further increase of the industry costs. During the period from 2020 to 2022 this increase could be estimated within the a range of 1% to 5% per year, and in 2024 it could achieve 6%. According to the forecast the biggest increase of costs relates to labour costs where the combined forecast predicts a general increase of 8% to 10% per year over the period from 2020 to 2024. As regards sub-fields, in 2020 a decrease of the industry costs is predicted in the construction of residential and non-residential buildings, as well as in the construction of roads and highways. The most rapid increase is predicted in the construction of bridges and tunnels. An increase of costs in all the sub-fields is forecasted as from 2022 by the construction of bridges and tunnels leading with an annual increase of 5-7%.

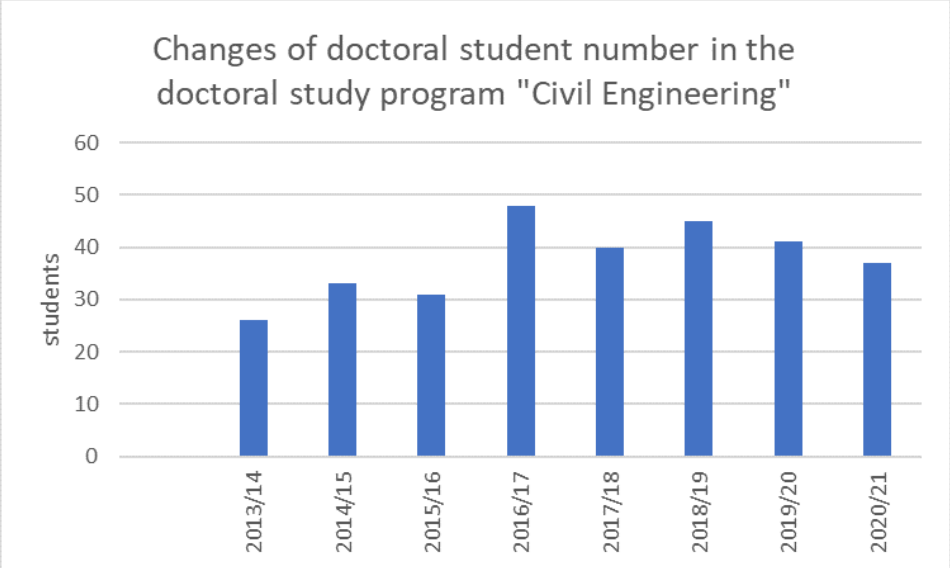
The civil engineering industry has experienced very fast development as from 2017. Its growth amounted to 19.4% in 2017 and to 21.9% in 2018; construction volumes increased in all the core groups of construction during the last year. Both availability of the EU funding and private investment encourage the industry growth. Attraction of employees in the industry has restarted since 2018, the number of employees was 74.6 thousand last year accounting for 30% increase compared to 2010, however, the pace of the growth was lagging behind that of the production growth. The wages of employees have increased considerably in the industry during the last two years and last year they amounted to 94.6% of the mean wage in the national economy.

The employment prospects of the graduates of the study program are very good, because the change of generations of the teaching staff of the RTU Faculty of Civil Engineering is very important. It should be noted that during the reporting period, out of 7 graduates of the program, 4 continue to work at the Faculty of Civil Engineering, 2 work in construction companies in Latvia and 1 in the traffic research institute VTT in Finland. Informative Report on Medium and Long-term Labour Market Forecasts (https://www.em.gov.lv/en/informative-report-medium-and-long-term-labour-market-forecasts-0) prepared by Ministry of Economics confirms that there are already not enough specialists in the economic sector “Engineering, manufacturing and construction”, as well as the fact that the number of unemployed with a doctoral degree in the mentioned sector is extremely low. In the construction sector, rapid growth is expected in the medium term (2022-2027), which will be facilitated both by the implementation of large investment projects (for example, Rail Baltica) and the need to gradually renew the current housing stock.

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

The number of the enrolled Doctoral students and the number of students at the programme over the reporting period are shown in the chart below. The changes in the number of students are explained by:

- The changing number of Master's studies graduates;
- Changes in the financial support of Doctoral students;
- Pace of development of the national economy.



7 PhD Theses were defended during the reporting period:

1. *Crack Development Assessment Using Modal Analysis in Peridynamic Theory*

Scientific adviser Professor Ainārs Paeglītis

The Thesis was defended on 29 November 2019.

2. *Structural Damage Identification based on Mode Shape Transformations and Supervised Learning*

Scientific adviser - Professor Andris Čate, Dr.sc.ing. Sandris Ručevskis

The Thesis was defended on 17 May 2019

3. *Alkali-Activated Aluminosilicate Composites with Heat-Resistant Aggregates for Industrial Applications*

Scientific adviser - Professor Diāna Bajāre, Professor Ina Pundiene

The Thesis was defended on 12 April 2019.

4. *Energy-Efficient Natural Fiber Biocomposites with Reduced Environmental Impact and Their Applications*

Scientific adviser Dr.sc.ing. Genādijs Šahmenko

The Thesis was defended on 02 November 2018.

5. *Fibre Development and Investigation of Pull-Out Behaviour in Concretes with Various Strength*

Scientific adviser Professor Andrejs Krasņikovs

The Thesis was defended on 14 September 2018.

6. *Design Principles of Rational Structure for Plates with Hollow Wooden Ribs*

Scientific adviser - Professor Kārlis Rocēns, Associated Professor Jānis Šliseris

The Thesis was defended on 07 September 2018.

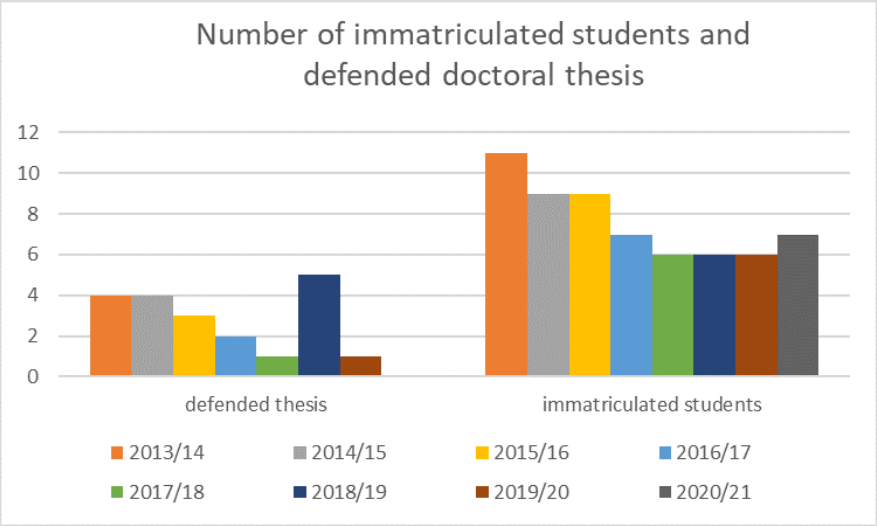
7. Progresīvo pultrūzijas procesu izstrāde

Design of Advanced Pultrusion Processes

Scientific adviser Professor Jevgenijs Barkanovs

The thesis was defended on 21 February 2018.

The dynamics of change in the number of Doctoral students and Doctoral candidates over the last years is shown in the chart below.



The costs of PhD studies are covered mainly by the state budget. Foreign students pay tuition fees, and their number at RTU tends to increase. Currently, a student from Sri Lanka is studying in the 1st year of the doctoral study program “Construction”, a student from India is studying in the 2nd

year, and a student from India is studying in the 3rd year.

The summarized statistical data for the reporting period allow concluding that drop-out rates for Doctoral studies is low, on average, they do not exceed 10% - 15% of the total number of students. The main reasons for drop-out were both family circumstances and difficulties in reconciling studies and work, as a part of the Doctoral students work outside RTU. Despite the above-mentioned factors, civil engineering is one of the cornerstones of the Latvian economy, which allows forecasting that there will be steady enrolment rates at the study programme.

Doctoral students actively participate in the study process as members of the academic staff and improve the existing courses within under-graduate and Master dtudy programmes with their pedagogical activities. In 2016, at the Council of the Faculty of Civil Engineering was elected the representative of Doctoral students. At the moment, Doctoral students are also represented at the Faculty Council.

Implementation of the study programme occurs only on full-time basis (4 years). The study programme is implemented in Riga in Latvian and English.

Students studying in Latvian have acquired study courses dedicated to civil protection and environmental protection at the lowest study levels. According to the decision of the RTU Senate of November 26, 2018, a foreign student must acquire a Latvian language course VSL711 “Latvian for Foreign Students” in addition to the content of the study program. If English language students at lower study levels have not completed study courses dedicated to civil protection and environmental protection, then they are offered courses ICA301 “Civil Defence” and BMT456 “Protection of Environment in Civil Engineering”.

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

3.2. The Content of Studies and Implementation Thereof

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

The PhD study program provides basic knowledge that forms a specific culture and intelligence level, enabling a student to undertake scientific – pedagogical and social work, contact with

scientists.

The PhD study program “Civil Engineering” aims to provide cutting-edge industry knowledge within the study courses. It should be pointed out that there are several fields of specialisation within the study programme - Building Constructions, Building Materials and Technologies, Building Mechanics, Geodesy and Geoinformatics, Road Transport and Infrastructure. Academic staff integrate the results of their recent research that have been quoted in the data bases (https://www-scopus-com.resursi.rtu.lv/) and performed elsewhere in the world within each field.

The curriculum of the study courses is updated taking into consideration the developments in civil engineering, labour market requirements and recommendations of the Study Field Council, etc.

Scientific supervisor plays an important role in achieving the learning outcomes. Appointment of the supervisor is regulated by the Regulations on Doctoral Studies approved by RTU Senate (https://www.rtu.lv/en/studies/doctoral-studies). Upon commencing the studies, the PhD studies, scientific supervisor is appointed for each Doctoral student by resolution of the Vice-Rector for Science. Scientific supervisor of a PhD Thesis should hold a Dr. habil. or Dr. degree who is actively involved in the research in their own research field or sub-field, which is attested by their publications and the status of the expert of the Latvian Council of Science. New scientific supervisors to the PhD Theses should receive recommendation from the council of a respective institute or faculty. It is possible to change the scientific supervisor. The change and approval of the scientific supervisor are made based on the decision of the council of the institute or faculty, which is submitted to the Doctoral Studies Department. In case of dispute, the change of the scientific supervisor is approved by the Scientific Council of RTU.

A Doctoral degree (PhD.) in the field of “Civil and Transportation Engineering” is awarded to the graduates of the PhD programme “Civil Engineering” if the following requirements have been fulfilled:

- A Thesis has been developed and successfully defended;
- All study courses of the study programme have been completed;
- At least one peer-reviewed scientific publication is published in a journal indexed in SCOPUS database with the calculated Source Normalized Impact per Paper (SNIP)) or indexed in Web of Science database with the calculated Impact Factor (IP);
- Peer-reviewed scientific publications are published in scientific journals or conference proceedings indexed in SCOPUS or Web of Science databases;
- Research results have been verified at the international scientific conferences or workshops;
- Up-to-date data analysis and processing techniques have been applied during the research.

One of the most important tasks in the doctoral study program “Civil Engineering” is to perform original scientific research, the results of which are reflected in the dissertation. Their topics are dedicated to solving the most topical issues of civil engineering science. Thus, the research process in the study program is devoted the most time. The mapping of the study program courses clearly indicates this. The study courses of all five sub-fields of the study program have been chosen so as to ensure the fulfillment of the goal and defined tasks of the study program by the interconnection of the information, the results to be achieved and the set goals. The mapping of the study program courses allows to conclude that the tasks defined in the study courses ensure the acquisition of skills, knowledge and competencies to be achieved during the study program. At the end of each study year, the scientific council of the faculty evaluates the work of doctoral students, during which doctoral students provide their views on the study courses and thus promote the formation of a feedback loop, which allows to improve the study process.

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

The content of the PhD programme "Civil Engineering" complies to legal requirements of the Republic of Latvia, internal RTU regulations, RTU and the Faculty of Civil Engineering (FCE) strategies, as well as supports the achievement of Sustainable Development Goals (SDGs).

FCE defines the following fields of research, which are managed in direct connection with the implemented study courses:

Field of research	(%)
Water supply and treatment, powder material research, regional development	25
Research in road, bridge and road-traffic, ground remote sensing and geomatics	10
Construction structures, their calculation and modelling, design of various structures	10
Research of heating, water and gas systems, civil engineering structures	25
Geotechnical investigations of building structures and research in construction physics	10
Composite materials, structures, strength analysis, technical monitoring	20

The themes of theoretical works and practical tasks of the study programme are regularly related to advances in the industry. Research and creative work results are regularly published in scientific journals and conference proceedings. FCE regularly publishes the journal "The Baltic Journal of Road and Bridge Engineering" https://bjrbe-journals.rtu.lv/, which is included in SCOPUS and WEB of Science databases. Annually, academic staff of FCE publish several dozens of articles in various national and international scientific periodicals and take part at local and international scientific conferences with more than 20 reports. Thematic diversity illustrates a broad spectrum of individual interests that offer diversity of information and creative work in the academic work.

Students in the PhD programme "Civil Engineering" have an opportunity to specialise in research fields in some of FCE civil engineering disciplines:

- Construction materials, structures and technologies;
- Sustainable and nearly-zero energy buildings and energy saving technical building systems;
- Smart, multipurpose composite materials and structures;
- Road and bridge design;
- Geomatics, including geodesy, remote sensing photogrammetrical surveying;
- 3D modelling and BIM.

A large specific share of PhD programmes in dedicated to individual PhD student work. At the same time, throughout programme implementation, students successively acquire knowledge, skills and competences.

The first year of studies (total 48 CP):

- Compulsory study courses in the volume of 16 CP– Application of numerical methods in civil engineering (10 CP). Within the course, students acquire comprehensive knowledge about numerical methods applied in structural design – theoretical basis, impact and opportunities of practical application. The next compulsory course is Research seminars in the field of specialization (6 CP). Within the course, students acquire skills of critical analysis, revision and editing of scientific articles, as well as acquire skills to deliver an effective presentation of research results. Moreover, a specific focus is put on information acquisition and analytical methods, presentation of research results, their impartial evaluation, as well as paperwork and publication arrangements.
- Compulsory elective study courses (6 CP),
- Research work (26 CP) is carried out in cooperation with a scientific supervisor of the thesis. At the end of the first year of studies, at least one publication is prepared and submitted, a conference paper is prepared and presented at an international conference.

The second year of studies (48 CP):

- Compulsory study courses in the volume of 5 CP, including study course BKA609 “Advanced materials in Civil Engineering” (5 CP).
- Professional specialisation study courses (10 CP), for instance, “Bridges”, “Cement composites and their structures”, “Geodynamics”, “Wood materials and constructions”, “The finite element method”, “Multilayer and three-layer constructions”, “Photogrammetrical surveying and remote sensing”, “Road-traffic planning”, “Road infrastructure”, “Numerical modelling of transport facilities”, “Transportation system and logistics”, “Application of global navigation satellite systems in geodesy”, “Theory of errors and theory of geodetical measurements equalization”
- Research work (33 CP) occurs in co-operation with the thesis supervisor. At the end of the second year of studies, at least two publications, as well as reports for international conferences must be prepared. The Thesis must be 30% ready.

The third year of studies (48 CP):

- Professional specialisation study courses (5 CP), for instance, “Geographical information systems (special course)”, “Creep of Structural Elements”, “Material Damage and Fracture Mechanics”, “Concrete science”, “Vibration Damping”, “Optimization of constructions”, “Advanced geodesy (special course)”,
- Research work (43 CP) is dedicated to research, publication of research results, participation in experience exchange and mobility projects. In this terms, a PhD student’s individual work becomes more and more important. The work on scientific publications continues (at least 2 publications must be written and submitted), international contact network of a new scientist is formed. The Thesis must be 75% ready.

The fourth year of studies (48 CP).

- Research work (48 CP). The thesis-related research comes to its end. A PhD student presents the Thesis for pre- defence to the committee that is to include the members of RTU Doctoral Council P-06, the Thesis supervisor, PhD students, etc. During the pre-defence, the research results are analysed, recommendations on the Thesis improvements are given and the decision on whether the Thesis can be submitted for the Thesis Viva Voce procedure or should be amended is taken. It must be noted that not all PhD students can fulfil stringent requirements within the planned schedule of studies. Along with that a part of the PhD students use the opportunity to take a sabbatical leave.

In the reporting period, an average term of Thesis development within the RTU PhD programme "Civil Engineering" exceeded 4 years.

From 2019 to 2021, the reconstruction of the building of the Faculty of Civil Engineering has been carried out, and as the result a modern building and new laboratory facilities will be built.

It is essential to improve and ensure a stimulating research environment for the researchers, so currently the faculty is trying to improve the research environment:

- Establishing and maintaining partnership or similar activities in the research community upon completion of the academic or Doctoral studies;
- Providing internationally recognized research process, taking into account a growing number of publications, research projects, conferences, etc.;
- Providing effective research infrastructure, making contributions to development of a high-quality research infrastructure and ensuring comprehensive resources for research activities;
- Providing sustainable innovations, commercialization and technology transfer, promoting interdisciplinary knowledge and technology creation, by establishing and maintaining international research partnership;
- Enhancing internal and external communications and cooperation.

Students of the doctoral study program "Civil Engineering" together with the supervisors of the doctoral thesis incorporate the knowledge gained in the course of their scientific research into lower-level study courses, which significantly help to improve and enrich their content with the latest scientific achievements.

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

According to the Resolution of RTU Senate of 29 March 2010 "Regulation on the Assessment of Learning Outcomes", the Resolution of RTU Senate of 25 May 2001 "On Criteria of Assessment of Learning Outcomes" and Resolution of RTU Senate of 29 January 2001 "On Transition to a United System of Assessment of Learning Outcomes", academic results at RTU are evaluated according 10-grade scale (10 – with distinction, 1 – very very poor). Forms of assessment include credit tests, term papers and exams in accordance with the study plans approved for each academic year.

The PhD programme "Civil Engineering" respects the principles of student-centred learning and training. Since during the reporting period the PhD students have been working at FCE Council, this fact has substantially contributed to involvement of students into the study process and curriculum improvement.

The PhD study programme with a large share of individual work, which respects the differences among the students taking into account academic background and experience of each student, as well as research activities, very well meets the principles of student-centred learning. It allows concluding that the courses within the study programme are student-centred. Implementation of

the study programme is carried out using different modes of the study course implementation. Students work in small groups, but at senior courses - through individual work, which allows applying appropriate and diversified pedagogical approaches.

Successful performance of the internal education quality assurance system at RTU is ensured at the following levels:

At the level of the Office of Vice-Rector for Academic Affairs, internal education quality assurance is performed by the Study Department, which:

- provides operations and control of RTU Study Course (SC) Register, monitoring whether the study course correspond to the requirements of the respective tertiary education program and its content;
- surveys students at the university level, as well as ensures that survey results are available to RTU Study Department, each member of academic staff, heads of departments, Deputy Dean for Studies and a responsible person at the Office of Vice-Rector for Academic Affairs;
- ensures relevant premises and technical support to general lectures (100 – 200 seats).

At the level of RTU faculties:

- once a year, the head of the study programme submits a report to the Council of the faculty, prior to that assessing and ensuring the relevance of the study program at the Faculty Study Field Commission;
- student self-government is involved in the overall quality assurance process of the study program. Representatives of the student self-government actively participate in work of decision-making bodies: RTU Academic Assembly, RTU Senate, RTU Senate Commissions and Faculty Council.

At the department level:

- each semester the administration of the study programme analyses the results of the student survey on the quality of academic staff performance and overall assessment of the study program. The results are discussed at the department meetings, meetings of the Faculty Study Field Commission and Faculty Council meetings;
- once per academic year annotations to the study course within the study program, course syllabi, methodological resources, the list of literature and the guidelines for development of the course works (reports, papers, internship reports and graduate papers) are reviewed;
- academic personnel and administration of the study program participate in various experience exchange activities, cooperating with universities from other countries, meeting representatives of the industry and entrepreneurs,;
- departments continuously monitor that the quality of the premises and equipment meets quality requirements and update the resources as necessary.

Additional quality assurance system accounting for the specifics of the study field is implemented within the study programme:

- regular monitoring of student individual performance (responsible authority – academic staff);
- regular reporting of performance results in the RTU Study Management System (responsible authority – faculty record management department);
- regular monitoring of the study program implementation process (responsible authority – program administration);
- regular discussion with the student self-government and program administration (responsible authority – student self-government);
- regular updating individual courses and themes accounting for the newest trends in the

research field (responsible authority – Faculty Study Program Council);
- arbitration mechanism (responsible authority – program administration).

Learning outcomes for each study course are defined separately and are included in the study course description, which are published in RTU Study Course Catalogue.

Examination and credit test questions are prepared by the instructor responsible for the study course based on the approved description of the study course and the study program. Tests are carried out in accordance with the requirements stipulated in effective RTU regulations.

The study programme meets the requirements of RTU Regulation on Doctoral Studies. In the course of studies, the aim of the PhD programme "Civil Engineering" is achieved – education and training of the specialists with advanced qualification in research and tuition in civil engineering or compatible fields for individual research work and management, which refers to Level 8 of the European Qualifications Framework (EQF) and Latvian Qualifications Framework (LQF).

Doctoral studies are planned for 4 years, divided into 8 study semesters. The duration of full-time studies is 4 years (48 weeks x 4 = 192 weeks). The amount of studies in doctoral studies is 192 CP (1 CP / week x 192 weeks). The volume of the study program and the total duration of studies are the same for students with different previously acquired education: 192 CP - for full-time studies.

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

Internship is not included into the PhD programme "Civil Engineering". Meanwhile, cooperation with the industry occurs within both national and international projects and contracts. The PhD students are involved in research projects (see statistics in Section 4.4.).

RTU is implementing the European Social Foundation project SAM 8.2.2. "Strengthening of Riga Technical University academic staff in the fields of strategic specialization". It offers an opportunity of apprenticeships at the industry companies. Thus, for instance, Professor M. Vilnītis underwent internship at "Fabrum" Ltd.

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

The promotion procedure is determined by the Regulations on Promotion Councils and Promotion at RTU. The promotion at RTU is allowed for the scientific domains, which are accredited for Doctoral study programmes in accordance with the Regulations of the Cabinet of Ministers No. 1000. At present, 19 Promotion Councils operate at RTU being entitled to confer a scientific degree in

architecture, civil engineering, electronics and telecommunications, electrical engineering, power engineering, information technologies, chemistry, chemical engineering, mechanical engineering, materials science, mechanics, transport and communication, management and environmental science.

The Promotion Councils confer the PhD degree for an independently developed and publicly defended promotion work under the supervision of an experienced scientist (a professor, an associate professor, an assistant professor and/or the leading researcher, who is approved in accordance with the procedure determined at RTU).

The promotion work may be a Doctoral Thesis, or a thematically united series of scientific publications, or a monograph – a refereed scientific book, which is dedicated to one subject.

For a PhD student, qualitative Doctoral Studies are completed with passing of all examinations and tests anticipated by the Doctoral Studies work plan, submission of the promotion work for defence of the PhD degree at the Promotion Council of the corresponding industry, public defence of the promotion work and obtaining the PhD degree.

The first stage on the way to obtaining the PhD degree is completed when a PhD student successfully passes all examinations and tests anticipated by the Doctoral Studies work plan, as well as develops his/her promotion work.

The second stage is submission of the promotion work to the Promotion Council of the corresponding industry for public defence. A structural unit of RTU, where the promotion work is developed, makes a decision at a meeting that the promotion work has been developed and is to be submitted to the Promotion Council of the corresponding industry. A candidate for the scientific degree submits an excerpt from the meeting proceedings together with other required documents (in accordance with the Regulations on Promotion Councils and Promotion at RTU) to the Promotion Council of the corresponding industry.

At **the third stage** the Promotion Council accepts the promotion work, when its author substantiates his/her choice of the subject, defines the goal and objectives of his/her research, characterises scientific achievements during the research of the subject and the used methods, reports on and discusses the results obtained in the work and conclusions, summarising these in the conclusions and the theses to be defended.

Not later than two weeks prior to the promotion work defence date determined by the Promotion Council, the PhD candidate, who has been already dismissed from the Doctoral Studies due to completion of the theoretical course, submits an application addressed to RTU Vice-Rector for Research for his/her reinstatement at Doctoral Studies to the Doctoral Studies Department; Places the promotion work, its summary (in Latvian and English) and the promotion work appendices in the electronic form on the ORTUS portal; Submits one copy of the promotion work and its summary (in Latvian and English) to the RTU library; Submits two copies of the promotion work and seven copies of its summary (in Latvian and English) to the National Library of Latvia.

Notices on submission of the promotion work and its summary to the libraries must be submitted to the Promotion Council Secretary prior to the defence.

The fourth stage is defence of the promotion work. The Regulations on Promotion Councils and Promotion at RTU provide information regarding the process of public defence of a promotion work and conferring the scientific degree.

The PhD degree is conferred to the candidate pursuant to the resolution of the Promotion Council, with the order of RTU Rector.

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

When commencing PhD studies, the theme of the Thesis is formulated for a PhD student, addressing a vital issue in the field of CFE research. Thus, the Director of the programme advises on a potential Thesis supervisor, who is approved by the decision of RTU Vice-Rector for Academic Affairs. Since in the course of research work a broader scope of issues than it was previously planned can be possibly covered, the theme of the Thesis can be reformulated before the Thesis Viva Voce Examination.

In the reporting period, the themes of all 7 defended theses to have been internationally focused. Their themes are related not only to civil engineering, but also promote, for example, application of construction materials production to the issue of climate change and industrial waste recycling, using the principles of the circular economy.

The developed study programme is oriented at those issues, as its goal is to educate and train internationally competitive higher qualification specialists for academic and research work at universities, R&D centres, as well as for organisational work at state and private institutions. Thesis evaluation procedure according to the Cabinet regulations No. 1001 ""The procedure and criteria for awarding of a PhD degree"" of 27 December 2005, performed by the Doctoral Council, reviews by three experts and public Viva Voce of the Thesis provide interconnection between the PhD programme outcomes and their reachability.

Alumni of the PhD programme "Civil Engineering" have carried out research in CFE specified fields of research: road, bridge and road traffic research, ground-based remote sensing and geomatics, building constructions, their calculation and modelling, design of different constructions, research in geotechnical conditions and construction physics, composite materials, structures, strength analysis, technical monitoring, etc.

By training highly qualified scientists who carry out innovative research and continue working at universities both in Latvia and abroad, the PhD programme "Civil Engineering" contributes significantly to achievement of UN sustainable development goals. For us, as for a university, **Item 4.c of goal 4** "**Provide inclusive and qualitative education and promote life-long learning opportunities" is most essential:** "To increase substantially the number of qualified members of academic staff during the period until 2030, amongst others by holding international cooperation events for training of academic staff in the developing countries and in particular in the least developed countries", which is implemented directly involving the academic staff and students of the study programme.

3.3. Resources and Provision of the Study Programme

3.3.1. Assessment of the compliance of the resources and provision (study provision, scientific support (if applicable), informative provision (including libraries), material and technical provision, and financial provision) with the conditions for the implementation of the study programme and the learning outcomes to be achieved by providing the respective examples.

Full information on these issues is provided in Criteria 2.3.1-2.3.3 of Chapter 3 of Part II of study field report. At this point, only additional information about the study programme is emphasized.

RTU Faculty of Civil Engineering (FCE) continuously monitors compliance to quality requirements of rooms and technical equipment, the appropriate lecture halls with necessary multimedia hardware have been equipped. In general, in the FCE building at 6A Ķīpsalas Street 4 computer rooms, 23 lecture rooms, 35 laboratory rooms are available for the needs of the study process. In order to ensure the qualitative study process, FCE is carrying out extensive refurbishment works, upon their completion the Faculty will meet international standards for campuses and lecture halls. Classification of the premises is given in the table below.

Room type	Number of rooms	Useful area m²
Meeting room	1	70.91
Computer rooms	4	***243.77***
Auditoriums	23	***1702.34***
Teachers' rooms, cabinets	69	1523.61
Assistant professor / Doctoral student premises	5	196.24
Workspace / workshop	6	172.19
Research facilities	6	350.53
Laboratories	35	1256.83
Resource room	6	213.53
Auxiliary room	11	197.99
Anteroom	3	35.89
Student self-government and record keeping	3	260.43
Kitchen	1	16.43
Total		**6240.69**

FCE institutes provide education and learning support: develop and update descriptions of the study courses, implement the corresponding study courses (including practical and laboratory works and seminars), supervision and defence of the Theses, and other activities related to learning, teaching and research work.

The research base consists of the existing FCE laboratories, databases, various software, as well as ample RTU scientific resources. Different research needs are met with modern world-class equipment and laboratories. In 2017 – 2020, substantial investments were made in the research infrastructure. For example, the Institute of Transport Engineering had acquired such equipment as

a Hamburg testing device (automatic Hamburg two-wheel tracker), as well as a roller-compactor, a four-point fatigue testing machine (four-point beam bending machine), a drone with infrared camera for open-air drone-based measurements and reading, as well as a high-resolution camera for additional imaging. In 2021, the Institute of Materials and Structures in cooperation with the largest manufacturer of construction materials in Latvia – "Sakret" Ltd., established a new laboratory – 3D concrete printing laboratory equipped with a 3m x 3m concrete 3D printer. In 2020, FCE founded the Centre for Digital Building Technologies that carries out active research and training in Building Information Modelling (BIM). Doctoral students at the programme "Civil Engineering" can carry out their scientific research not only using FCE equipment, but also "UseScience" equipment. RTU hosts the research equipment and service portal "UseScience" for research institutions, students, entrepreneurs and other stakeholders, partner institutions and industrial companies in Latvia and abroad. The portal offers an opportunity to contact a person, responsible for a certain equipment, and agree on a service or equipment lease. RTU concluded cooperation agreements with other research institutions about the use of research equipment; it is possible also for commercial companies, if financial conditions allow this.

RTU research department manages Research Support Fund, which provides support to research activities, ensures research infrastructure maintenance and accessibility, as well as grants financial support to publications in Open Access Journals and through open publishing of RTU scientific articles.

See information on the learning infrastructure in Item 2.3.1. of Part II Section 3.

See information on the research infrastructure in Item 2.3.1. of Part II Section 3.

See information on the information base infrastructure in Item 2.3.3 of Part II Section 3.

See information on the technical resource infrastructure in Item 2.3.2. of Part II Section 3.

See information on the funding infrastructure in Item 2.3.1 of Part II Section 3.

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

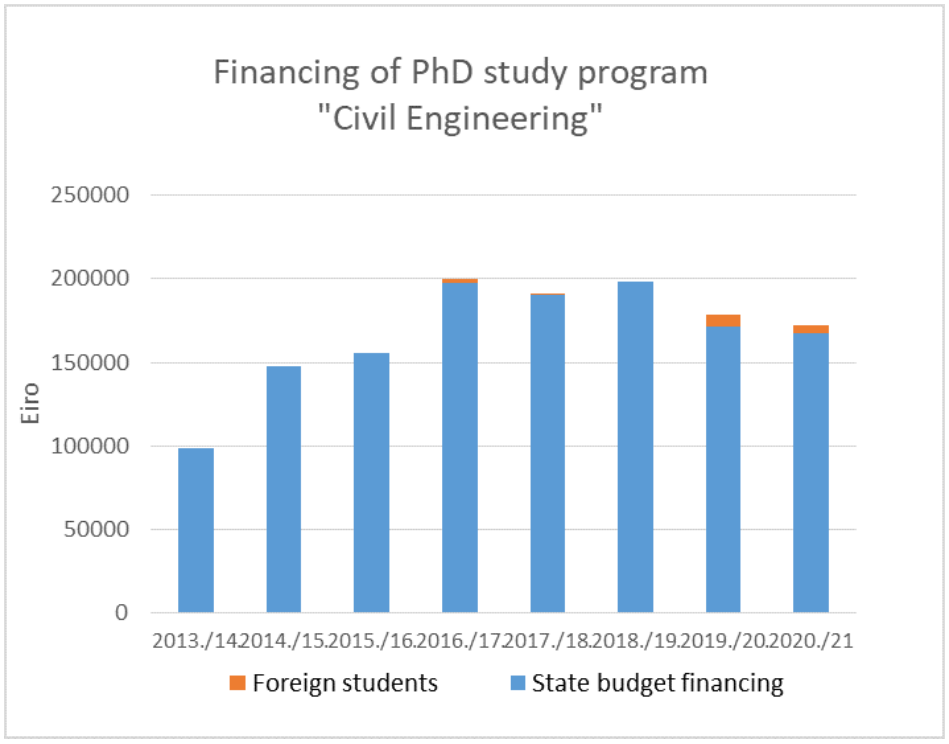
At the domestic scale, the most significant partner in implementation of the PhD programme is Latvia University of Life Sciences and Technologies. This is proved by participation of RTU FCE academic staff in the work of the Doctoral Council in Civil Engineering of LULST, in organization of scientific conferences and workshops.

The following universities may be mentioned as the most significant foreign partners in implementation of the PhD programme: Vilnius Gediminas Technical University (Lithuania), Kaunas Technical University (Lithuania), Tallinn University of Technology (Estonia), Brno University of Technology (Czech Republic), Palermo University (Italy). There are positive trends in communications with the University of Padua (Italy), etc. (the list of partner universities is given in Section 2.5.1).

Research and information resources are used jointly by all partner high schools, knowledge and experience exchange is provided, summer schools, intensive study programmes, Doctoral student and/or academic staff internship, projects, joint publications and other activities are being implemented. It is described in more detail in Section 3.1 and the study course report.

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

The PhD programme “Civil Engineering” is funded both by state budget and from foreign tuition fees from physical entities. The number of state budget funded seats at the PhD programme is regulated by the annual agreement between RTU and the Ministry of Education of Since, thus the number of seats at the programme changes on the annual basis. The dynamics of the changes in funding by the source of funding is shown in the chart.



Bar chart: Funding of the PhD programme “Civil Engineering” (2013-2020)

According to the funding calculation methodology set by RTU, the amount of funding for one academic year student of the doctoral study program “Civil Engineering” in 2021 is 8314 Euros.

The Cabinet of Ministers Order No. 345 of June 25, 2020 “On the Conceptual Report “On the Introduction of a New Doctoral Model in Latvia” states that: “Currently, State Budget funding for one doctoral study place is from ~ 4500 to ~ 16,000 euros per year”. Thus, it is clear that the funding allocated to the doctoral study program “Civil Engineering” is in the middle of this interval.

The calculation of costs includes such items as the salary of the teaching staff, the employer's mandatory state social insurance contributions per study place per year, business trip and business trip costs per study place per year, service costs per study place per year, which include communication service costs per study place per year, real estate tax on land per study place per year, repair costs per study place per year, maintenance costs per study place per year, provision of administrative work per study place per year as well as other services per study place per year

per year; costs of materials, energy resources, water and inventory per one study place per year, which includes the costs of consumed electricity, heating, water supply, sewerage, purchase of teaching aids and materials per one study place per year, purchase of equipment per student per year, purchase of stationery per study place per year, purchase of books and magazines per student per year, purchase and modernization of equipment per study place per year, social security costs of the study place.

Information on the minimum number of students in RTU study programmes is provided in the appendix of the self-evaluation report "On minimal number of students in study programmes".

Information on the funding distribution between the cost items is provided in the appendix of the self-assessment report "Funding distribution between the cost items".

The specific development of each study programme is the responsibility of each study programme director, as well as the faculty responsible. For the development of all study programmes, central funding is used for the renewal of the research library, improvement and maintenance of shared classrooms, public relations, programme marketing activities, development and maintenance of information systems related to the study process, development of the Ķīpsala complex and other activities.

Tuition fees are set in line with the National Audit Office's warning that tuition fees for students studying with budget students cannot be less than the public funding for this service. Part-time extramural studies do not receive State funding, so tuition fees are set taking into account a number of factors, such as the programme's ability to cover its costs, the market situation, demand for the programme, the stage of development of the programme, etc.

3.4. Teaching Staff

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

At this point, compliance of the qualifications and competencies of the involved academic staff to the requirements of the study course is considered.

In 2015-2021, a total of 279 articles by the academic staff working at the PhD programme have been published in the journals indexed in SCOPUS database. Breakdown of the publications by research field is given in the chart below.

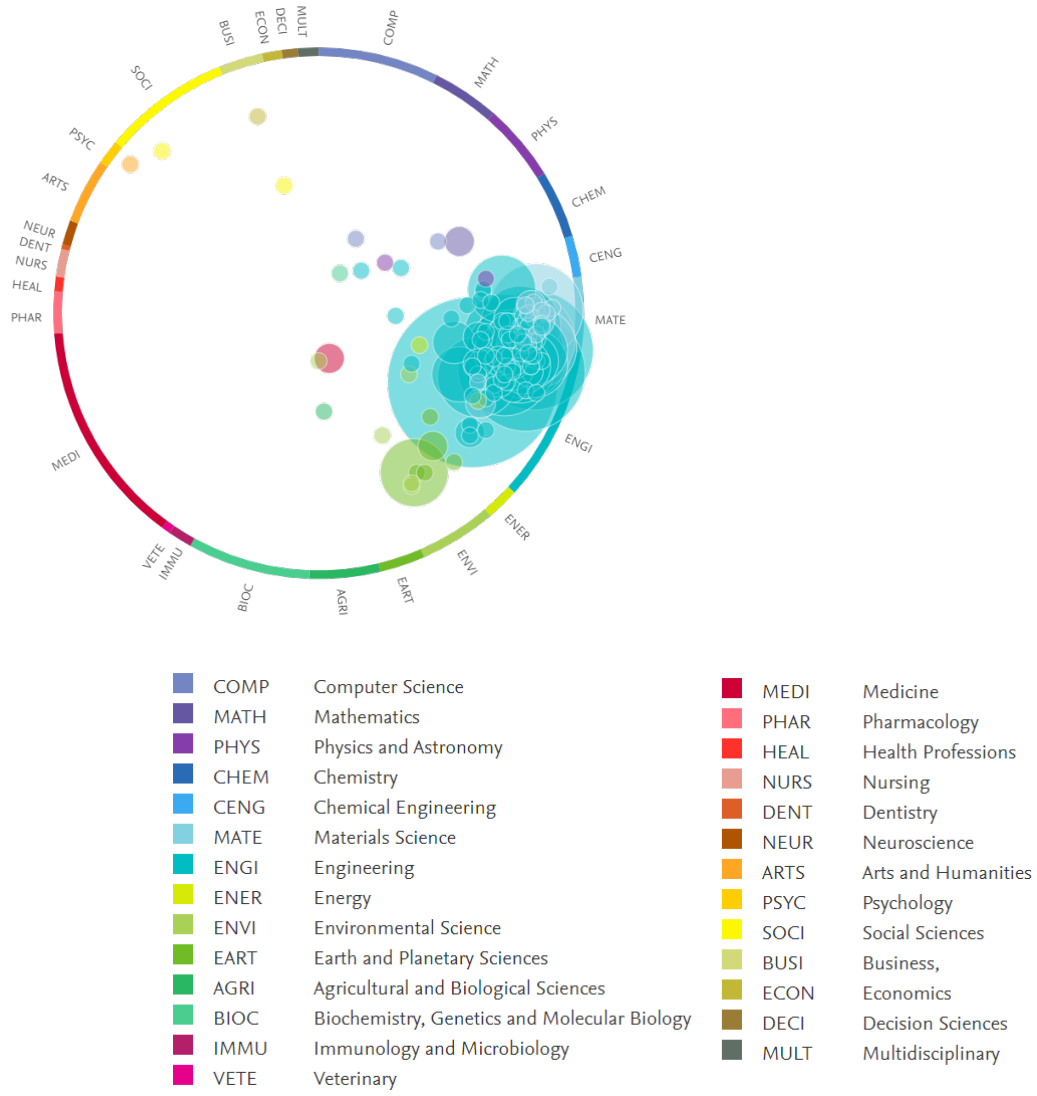


Figure: Input of SCOPUS indexed publications by the academic staff working at the PhD programme "Civil Engineering" (in 2015-2021; the data for 2021 is incomplete) (SciVal data).

The programme employs 13 professors – Doctors of Science, who were elected professors by the Professors' Council of Civil Engineering and whose scientific and teaching qualifications meet regulations on the criteria for evaluating scientific, teaching and organizational qualifications of the candidates for the position of a professor. The professors elected by the Professors' Council of Civil Engineering:

Viktors Mironovs has been specializing in research of powder materials, he is the author of 32 Latvian patents and 184 publications.

Raimonds Ozoliņš has been specializing in calculations of structures and has worked in research for more than 40 years, focusing mainly on inspection and research of different buildings and structures.

Leonīds Pakrastiņš has been specializing in research of concrete, composite materials and masonry structures, is involved in EUROCODE regulation base implementation. He is a member of editorial boards of multiple scientific journals. He authored 105 publications.

Jevgenijs Barkanovs has been specializing in application of the finite element method, as well as in structural dynamics, strength, elimination of oscillations; participated in 10 international projects, the author of 154 publications.

Dmitrijs Serdjuks has been specializing in pilot testing of structural building elements and structure optimization; the author of dozens of Latvian patents and 122 publications.

Aleksandrs Korjakins has been specializing in high performance concrete, green construction materials, material recycling and building structure expertise. Professor is member of editorial boards of international journals He is the author of 210 publications.

Ivars Radiņš has been specializing in analysis of structure dynamics. He is the author of 23 publications.

Ainārs Paeglītis has been specializing in safety and durability of bridge structures. Professor Paeglītis is the chief editor of the scientific journal "The Baltic Journal of Road and Bridge Engineering" (https://bjrbe-journals.rtu.lv/). He managed 19 RTU projects, is the author of 91 publications.

Modris Dobelis. Professor has been specializing in calculation of structures and graphical representation of the results, training in the principles of Building Information Modelling. In 2002-2008 he was the president of the International Association for Geometry and Graphics BALTGRAF, a member of the editorial panel of the Polish journal "The Journal Biuletyn of Polish Society for Geometry and Engineering Graphics". He is the author of 78 publications.

Atis Zariņš has been specializing in spatial design and research of cover beam loads, the author of 26 publications.

Mārtiņš Vilnītis has been specializing in analysis and research of construction industry and technology problems, within international cooperation with Salerno University organized summer schools, the author of 4 Latvian patents and 32 publications.

Juris Smirnovs has been specializing in road traffic safety and road pavement research. Juris Smirnovs is an editor of the scientific journal "The Baltic Journal of Road and Bridge Engineering", the author of 59 publications.

Andris Čate has been specializing in research and analysis of composite materials. Professor is the chief editor of the scientific journal "Mechanics of Composite Materials" (http://www.pmi.lv/html/EnJournalAbout.html). Professor managed 18 international RTU projects and is the author of 85 publications.

The study programme employs 5 elected **associate professors** and Doctors of Science who were elected associate professors by the Professors' Council of Civil Engineering and whose scientific and teaching qualifications meet the criteria for evaluating scientific, teaching and organizational qualifications of a candidate for the position of an associate professor specified in the regulations. The associate professors elected by the Professors' Council of Civil Engineering:

Līga Gaile took part in the implementation of the National Plan for Introducing Eurocode Standards and development of domestic annexes, The field of research covers the issue of oscillations in complex building constructions she is the author of 51 publications and 1 Latvian patent.

Jānis Šliseris field of research is related to analysis of the properties of timber materials and development of new composite materials, the author of 3 Latvian patents and 48 publications.

Jānis Kaminskis focuses his attention on research of geoid heights and gravimetric methods; participated in 22 RTU projects, is the author of 38 publications.

Māris Kaļinka focuses his attention on the research in 3D modelling, 3D laser scanning, architectural photogrammetry, GIS, remote sensing and ground modelling. Participated in 9 RTU projects and is the author of 35 publications.

Genādijs Šahmenko. Direction of scientific research - high performance cement concrete. Participated in 25 RTU projects and is the author of 128 publications and 8 patents.

Highly professional teaching staff is involved in the implementation of the doctoral study program "Civil Engineering", whose internationally recognized research results allow the study courses to directly use the latest research findings. The active participation of lecturers in international projects, participation in international conferences, experience of international cooperation and experience gained during the internship in companies in the field allows for a better understanding of the perspective development directions and tendencies of construction science. It allows students to provide practical examples of current events in construction science and thus promote their interest and development of practical research skills. The qualification of the teaching staff promotes the achievement of study results and develops the appropriate skills and competencies required for the development of the doctoral thesis.

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

General evaluation of the academic staff is given in the information and academic staff CVs in Criteria 2.3.5-2.3.6 of Part II, Section 3 of the study field report. In this item, the changes in the academic staff involved in programme implementation and their competence in delivering certain study courses will be in focus.

Implementation of the study programme involves RTU FCE scientific and academic staff with Doctoral degree in Engineering: 1 Habilitated Doctor of Science and 19 Doctors of Science, including 11 engineering and technology experts of the Latvian Council of Science (LCS). The choice of the academic staff is based on scientific experience, research interests, academic achievements, etc., taking into account the specifics of the study programme and the study courses.

The table below summarizes the information about qualification of the academic staff at the PhD programme “Civil Engineering”. The information about the study courses delivered at the Doctoral level given in the table include compulsory (part A and B) and part E (final / state examination) study courses. Elective study courses are not included in this table, but are available in the Annexes with descriptions of the study courses.

Two main reasons why members of academic staff quit working at the study programme should be mentioned. One of them is retirement, another – termination of employment due to commencement of work in the construction industry, which can offer a significantly higher salary.

The tasks of the Faculty of Civil Engineering with regard to academic staff issues are:

- Recruitment of new members of the academic and research staff;
- Involvement of foreign researchers;
- Professional training of the existing research and academic staff.

These tasks are being actively accomplished through involvement of new scientists in research projects, as well as through work on increase of the number of Doctoral students and awarded PhD degrees. The important role in this activity is given to RTU Doctoral and post-doc grants, which allow inviting new international researchers to RTU.

At the moment, RTU is implementing European Social Fund Project SAM 8.2.2. “Strengthening Riga Technical University Academic Staff in the Strategic Specialization Areas”, where one the tasks is recruitment of new members of academic staff. The goal of the project is to strengthen RTU academic staff in 10 study fields of strategic specialization, including the study field “Architecture and Civil Engineering”. The project activities are carried out in three areas:

- Involvement of Doctoral students in the work of the academic staff at RTU,
- Involvement of foreign academic staff in the work of the academic staff at RTU,
- Improvement of the existing academic staff qualifications, including academic staff internship at an economic operator.

Within the project, academic staff have an opportunity to develop their competence at the courses in professional English, as well as specialized training courses.

In order to provide and maximize the effect of research activities and development of the academic staff, RTU management signs annual agreements with each RTU Faculty.

Professor Kārlis Rocēns and Professor Jānis Štrauhmanis have passed away during the reporting period. Professor K.Rocēns led the study courses BBK608 Wood Materials and Structures and BBK611 Scientific Seminars in the specialization. These study courses were taken over by Professor Leonīds Pakrastiņš. Professor Pakrastiņš has actively participated in the implementation of the EUROCODE regulatory framework in Latvia and later also abroad. Professor Jānis Štrauhmanis led the study course BĢE009 Scientific Work, which was taken over by Associate Professor Jānis Kaminskis, who had an internship in Switzerland at the Zurich ETH for more than a year. Associate Professor J.Kaminskis is the President of the Latvian National Committee of the International Union of Geodesy and Geophysics (IUGG). During the reporting period, Juris Biršs, an assistant professor, retired and he has taught the study course BMT 601 Concrete Science. It was taken over by Associate Professor Gennady Shakhmenko. Associate Professor G.Shahmenko is a Latvian and internationally recognized expert in concrete issues and currently heads the Latvian Concrete Union. Taking into account that the values of the h index of the teaching staff attracted during the reporting period several times exceed the defined minimum requirements and knowing the positive experience of their international activities, we can conclude that the quality of the study program implementation has improved.

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

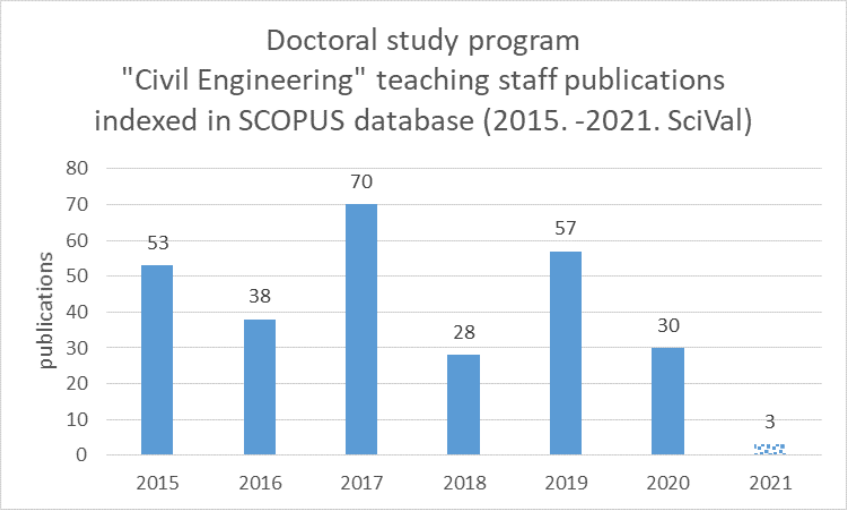
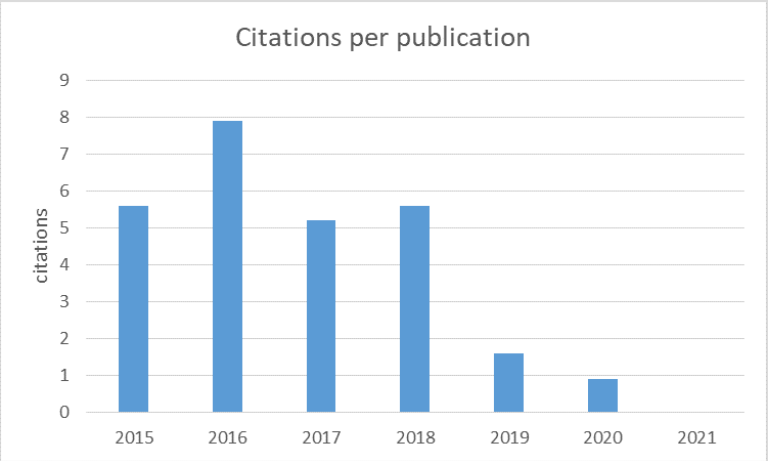


Figure. Dynamics of SCOPUS indexed publications written by the academic staff working at the PhD study programme “Civil Engineering” in 2015-2021 (SciVal data)

Based on SciVal data, the main topics covered in the SCOPUS indexed articles published by the PhD programme “Civil Engineering” academic staff in 2015-2021 (a total of 279 publications) include Engineering (39.5%), Material Science (28.5 %), Physics and Astronomy (7.8%). In 2015-2021, publications by the academic staff of the PhD programme “Civil Engineering” made contribution to the development of 140 topics (77 thematic clusters).

In 2015-2021, 279 publications have been cited 1230 times, average 4.4 citations per publication. 16.8% publications belong to 10% of most cited publications globally, while 8.5% scientific articles were published in CiteScore top 10% journals.



Most significant partners in development of scientific publications:

Tallinn University of Technology – a total of 15 scientific articles were published;

Latvian University – a total of 14 scientific articles were published

Koszalin University of Technology – a total of 12 scientific articles were published;

St. Petersburg Polytechnic University - a total of 11 scientific articles were published;

Vilnius Gediminas Technical University - a total of 9 scientific articles were published;

German Aerospace Center - a total of 6 scientific articles were published;

Research work is an integral part of the activity of the academic staff at the PhD programme “Civil Engineering”. Researchers regularly publish the results of their research in scientific journals and

report about them to the researchers from other countries at the international conferences. The most significant 10 publications written by the academic staff and Doctoral students over the past years, indexed in SCOPUS and Web of Science databases are listed below:

- Tsagarakis, K.P, Efthymiou, L. (...) Bajare.D. **A review of the legal framework in shallow geothermal energy in selected European countries: Need for guidelines //**

Renewable Energy ,Volume 147, March 2020, Pages 2556-2571

SNIP latest (SCOPUS) 2,366; Cite Score latest (SCOPUS) 11,2 Cited by (2021) 14

https://www-scopus-com.resursi.rtu.lv/record/display.uri?eid=2-s2.0-85055870193&origin=resultslist&sort=plf-f&src=s&st1=&st2=&sid=604141924e8e8d90303aa7a0f13d61c8&sot=b&sdt=b&sl=19&s=AUTHOR-NAME%28Bajare%29&relpos=9&citeCnt=14&searchTerm=

- Bumanis, G., Novais, R.M. Carvalheiras, J., Bajare, D., Labrincha, J.A. **Metals removal from aqueous solutions by tailored porous waste-based granulated alkali-activated materials**.

Applied Clay Science, Volume 179, October 2019, Article number 105147; **SNIP latest (SCOPUS)** 1.668; **Cite Score latest (SCOPUS)** 7.6; **Cited by (2021)** 16; https://www.scopus.com/record/display.uri?eid=2-s2.0-85066255337&origin=resultslist

- Labans, E., Kalnins, K., Bisagni, C..**Flexural behavior of sandwich panels with cellular wood, plywood stiffener/foam and thermoplastic composite core**;

Journal of Sandwich Structures and Materials. Volume 21, Issue 2, 1 February 2019, Pages 784-805; **SNIP latest (SCOPUS)** 1.386; **Cite Score latest (SCOPUS)**5.0; **Cited by (2021)** 13; https://www-scopus-com.resursi.rtu.lv/record/display.uri?eid=2-s2.0-85042528227&origin=resultslist&sort=plf-f&src=s&st1=&st2=&sid=e5250bbcaafa4a32f13f316feee3f311&sot=b&sdt=b&sl=23&s=AUTHOR-NAME%28Kalnins%2c+K%29&relpos=11&citeCnt=13&searchTerm=

- Sinka, M., Van den Heede, P., De Belie, N., (...), Sahmenko, G., Korjakins, A.; **Comparative life cycle assessment of magnesium binders as an alternative for hemp concrete**;

Resources, Conservation and Recycling 133, pp. 288-299; **SNIP latest (SCOPUS)** 2.584; **Cite Score latest (SCOPUS)**10.7; **Cited by (2021)** 28; https://www.scopus.com/record/display.uri?eid=2-s2.0-85042883098&origin=resultslist&sort=plf-f&src=s&st1=bajare&st2=&sid=c55bc966db52e0c379ff1275ff986585&sot=b&sdt=b&sl=19&s=AUTHOR-NAME%28bajare%29&relpos=3&citeCnt=2&searchTerm=

- Moukannaa, S., Loutou, M., Benzaazou, M., Vitola, L., Alami, J., Hakkou, R.; Recycling of phosphate mine tailings for the production of geopolymers;

Journal of Cleaner Production, pp. 891-903

SNIP latest (SCOPUS) 2.394; **Score latest (SCOPUS)** 10.9; **Cited by (2021)** 44; https://www.scopus.com/record/display.uri?eid=2-s2.0-85046024776&origin=resultslist&sort=plf-f&src=s&st1=vitola&st2=&sid=fedf5da932b811036c26a5722f37fa6f&sot=b&sdt=b&sl=19&s=AUTHOR-NAME%28vitola%29&relpos=9&citeCnt=0&searchTerm=#

- Dauti, D., Tengattini, A., Dal Pont, S.,Toropovs, N., Briffaut, M., Weber, B.; Analysis of moisture migration in concrete at high temperature through in-situ neutron tomography

Cement and Concrete Research 111, pp. 41-55; **SNIP latest (SCOPUS)** 3.170; **Score latest**

(SCOPUS) 11.0; **Cited by (2021)** 16; https://www.scopus.com/record/display.uri?eid=2-s2.0-85049341856&origin=resultslist&sort=plf-f&src=s&sid=c7b53417074375d4f2967da8647308fc&sot=autdocs&sdt=autdocs&sl=18&s=AU-ID%2855987795800%29&relpos=0&citeCnt=0&searchTerm=#

- Franciszczak, P., Kalniņš, K., Błędzki, A.K.; **Hybridisation of man-made cellulose and glass reinforcement in short-fibre composites for injection moulding – Effects on mechanical performance**; *Composites Part B: Engineering, 145, pp. 14-27*

SNIP latest (SCOPUS) 2.619; **Score latest (SCOPUS)**11.1; **Cited by (2021)**10; https://www.scopus.com/record/display.uri?eid=2-s2.0-85045795912&origin=resultslist&sort=plf-f&src=s&sid=fade7092cc62703dd8d7a0db1674dd94&sot=autdocs&sdt=autdocs&sl=18&s=AU-ID%2812142723900%29&relpos=1&citeCnt=2&searchTerm=

- Fedorov, V.A., Barkanov, E.N.; **Homogenisation of viscoelastic damping in unidirectional composites under longitudinal shear**;

Composites Part B: Engineering. Volume 113, 15 March 2017, **SNIP latest (SCOPUS)** 2.619; **Score latest (SCOPUS)**11.1; **Cited by (2021)**3; https://www.scopus.com/record/display.uri?eid=2-s2.0-85009775194&doi=10.1016%2fj.compositesb.2017.01.015&origin=inward&txGid=fc8cd3663ffbb9627877ce5bcd2bc4b6

- Bumanis, G., Vitola, L., Bajare, D., Dembovska, L., Pundiene, I.; Impact of reactive SiO2/Al2O3 ratio in precursor on durability of porous alkali activated materials;

Ceramics International; Volume 43, Issue 7, 1 May 2017, Pages 5471-5477; **SNIP latest (SCOPUS)**1.310; **Score latest (SCOPUS)**6.1; **Cited by (2021)**19; https://www.scopus.com/record/display.uri?eid=2-s2.0-85010543197&origin=resultslist

- Janeliukstis, R., Rucevskis, S., Wesolowski, M., Chate, A.; **Experimental structural damage localization in beam structure using spatial continuous wavelet transform and mode shape curvature methods**;

Measurement: Journal of the International Measurement Confederation; Volume 102, 1 May 2017, Pages 253-270; **SNIP latest (SCOPUS)**1.791; **Score latest (SCOPUS)**5.5; **Cited by (2021)**37; https://www-scopus-com.resursi.rtu.lv/record/display.uri?eid=2-s2.0-85013304475&origin=resultslist&sort=plf-f&src=s&st1=&st2=&sid=50ed0a3a5015c894d244f0b7f6814a9f&sot=b&sdt=b&sl=25&s=AUTHOR-NAME%28Rucevskis%2c+S%29&relpos=13&citeCnt=37&searchTerm=

The following 14 teaching staff of the doctoral study program “Civil Engineering” have the rights of an expert of the Latvian Council of Science:

Name	Surname	Brunch of Science	Term
Jevgēnijs	Barkanovs	Civil Engineering Material Science	26/03/2022 24/03/2023
Andris	Čate	Mechanical Engineering Civil Engineering	18/09/2022 26/02/2022/
Viktors	Mironovs	Mechanical Engineering	28/11/2021/
Leonīds	Pakrastiņš	Civil Engineering	17/06/2023/
Dmitrijs	Serdjuks	Civil Engineering	05/05/2024/

Aleksandrs	Korjakins	Civil Engineering	29/07/2022/
Ainārs	Paeglītis	Civil Engineering	23/04/2023/
Atis	Zariņš	Civil Engineering	03/03/2024/
Juris	Smirnovs	Civil Engineering	02/12/2023/
Mārtiņš	Vilnītis	Civil Engineering	30/06/2024/
Jānis	Kaminskis	Civil Engineering	06/01/2024/
Jānis	Zvirgzds	Civil Engineering	16/10/2023/
Līga	Gaile	Civil Engineering	05/05/2024/
Jānis	Šliseris	Civil Engineering	18/09/2022/
Genādijs	Šahmenko	Civil Engineering	29/07/2022/

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

During the reporting period, the academic staff of the faculty, involving Doctoral students, has actively implemented international and Latvian scale scientific projects. The most important international projects include:

Innovative materials and smart technologies for environmental safety (IMATEH) 2014. – 2017. Financing: EUR 1,100,000. Source of funding: State budget of Latvia.

Scientific supervisor of the programme – Professor Andris Čate.

Cooperation of Space NCPs as a Means to Optimise Services under Horizon (COSMOS2020plus). 2018-2020 Source of funding: HORIZON 2020. Financing: EUR 24,812.50. Scientific supervisor – leading researcher Kaspars Kalniņš.

Technology for Hybrid Thermoplastic Advanced 3D composite production (TEHART-3D) 2018 -2021. Source of funding: ERDF. Financing: EUR 330,000. Scientific supervisor – leading researcher Kaspars Kalniņš.

Innovative use of reclaimed asphalt for sustainable road construction layers (2017-2020) Source of funding: ERDF. Financing: EUR 648,000. Scientific supervisor – leading researcher Viktors Haritonovs.

SEcurity REsearch NCP network 4 (SEREN4) (2018-2021) Source of funding: HORIZON 2020. Financing: EUR 70,672.50. Scientific supervisor – leading researcher Kaspars Kalniņš.

Development of a new concept for the construction of low-energy buildings from ecological building materials 2020-2023. Source of funding: ERDF. Financing: EUR 645,345.85. Scientific supervisor – professor Diana Bajare.

Improving the efficiency of traditional pultrusion processes. 2019-2022. Source of funding:

ERDF. Financing: EUR 639,498. Scientific supervisor – professor Jevgenijs Barkanovs.

A New Concept for Sustainable and Nearly Zero-Energy buildings 2017-2020. Source of funding: ERDF. Financing: EUR 648,648. Scientific supervisor – professor Aleksandrs Korjakins.

Development and validation of methodology for assessment of damage resistance properties of sandwich structures for European space sector (BNM4EKS) 2015- 2017. Source of funding: European Space Agency. Financing: EUR 200,000. Scientific supervisor – leading researcher Kaspars Kalniņš.

Implementation of Multiscale Nonlinear viscoelastic and viscoplastic material model in Finite Element Method (2021-2023) Source of funding: ERDF. Financing: EUR 111,504.90. Scientific supervisor – professor Leonids Pakrastins.

Development of New Structural Health Evaluation Method for Health Monitoring of Structural Components (2020.- 2023.) Source of funding: ERDF. Financing: EUR 133,805.88. Scientific supervisor – professor Andris Čate.

Experimental study of new cement and concrete composites creep and shrinkage deformations (2020- 2023) Source of funding: ERDF. Financing: EUR 133,805.88. Scientific supervisor – professor Leonids Pakrastins.

Structural Health Monitoring of Buildings under Ambient Vibrations (2020-2023) Source of funding: ERDF. Financing EUR 133,805.88. Scientific supervisor – associated professor Jānis Šliseris.

3D printed bio-based materials for application in construction industry (2020 -2023) Source of funding: ERDF. Financing EUR 133,805.88. Scientific supervisor professor –Diāna Bajāre.

Development of interactive and animated drawing teaching aids (DIAD-TOOLS). (2017-2020) Source of funding: ERASMUS+. Financing: EUR 270,160. Scientific supervisor –professor Modris Dobelis.

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

Within the study programme, there is a cooperation stimulation mechanism for academic staff that provides enhancement and integration of the study courses. Both Doctoral student survey results and alumni survey results allow getting feedback, which identifies certain shortcomings. Thus, the study courses are improved on a regular basis, considering both student suggestions and industry development trends.

Upon completion of every academic year, Doctoral student competence is attested by the Scientific Committee of the Faculty of Civil Engineering. At the attestation meetings, Doctoral students inform the Committee and their groupmates about the progress in their research and their learning issues. Moreover, such discussions are a form of feedback, which allows defining the character of necessary additions and amendments. During reconciliation of the study courses, all relevant academic staff are involved, ensuring that the themes considered within the study programme are continuously updated and optimized in cooperation with the associated industry professionals.

Cooperation of the academic staff within the study programme is considered to promote achievement of the learning outcomes. Reviewing and updating the study programme, the academic staff mutually agree on the most appropriate and effective solutions for evaluation of the learning outcomes and achievement of performance indicators. Periodical discussions and review of the study course syllabus help achieve thematically harmonized and complementary training, avoiding duplication of questions discussed in different courses within one study programme.

The rate of the RTU elected and permanently employed academic staff to students at the PhD programme “Civil Engineering” is approximately 1 to 2.

Annexes

III - Description of the Study Programme - 3.1. Indicators Describing the Study Programme		
Sample of the diploma and its supplement to be issued for completing the study programme	RBDB0.zip	RBDB0.zip
For academic study programmes - Opinion of the Council of Higher Education in accordance with Section 55, Paragraph two of the Law on Higher Education Institutions (if applicable)	AIP Conclusion - Nr.84_RTU_Doc_Civil Engineering.pdf	AIP Atzinums - Nr_84_RTU_Dokt_Buvnieciba.pdf
Compliance of the joint study programme with the provisions of the Law on Higher Education Institutions (table) (if applicable)		
Statistics on the students in the reporting period	Annex 5_RBDB0.pdf	5. pielikums_RBDB0.pdf
III - Description of the Study Programme - 3.2. The Content of Studies and Implementation Thereof		
Compliance with the study programme with the State Education Standard		
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard or the requirements for professional qualification (if applicable)		
Compliance of the study programme with the specific regulatory framework applicable to the relevant field (if applicable)		
Mapping of the study courses/ modules for the achievement of the learning outcomes of the study programme	Annex 8_RBDB0.pdf	8. pielikums_RBDB0.pdf
The curriculum of the study programme (for each type and form of the implementation of the study programme)	Annex 9.pdf	9. pielikums.pdf
Descriptions of the study courses/ modules	RBDB0_EN.zip	RBDB0_LV.zip
Description of the organisation of the internship of the students (if applicable)		
III - Description of the Study Programme - 3.4. Teaching Staff		
Confirmation that the academic staff of the doctoral study programme includes not less than five doctors, of which at least three are experts approved by the Latvian Council of Science in the branch or sub-branch of science in which the study programme intends to award a scientific degree (if applicable)	Confirmation - on compliance of the academic staff of the doctoral study programmes.zip	Apliecinājums - LZP eksperti doktora programmā.zip
Confirmation that the academic staff of the academic study programme complies with the requirements specified in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions (if applicable)	Confirmation - on compliance of the academic staff.edoc	Apliecinājums - AL 55. pants par prof. skaitu akadēmiskās programmās.edoc

Transportation Engineering (42582)

Study field	*Architecture and Construction*
ProcedureStudyProgram.Name	*Transportation Engineering*
Education classification code	*42582*
Type of the study programme	*Professional bachelor study programme*
Name of the study programme director	*Ainārs*
Surname of the study programme director	*Paeglītis*
E-mail of the study programme director	*ainars.paeglitis@rtu.lv*
Title of the study programme director	*profesors/ doktora*
Phone of the study programme director	
Goal of the study programme	*The aim of the study programme is to prepare competitive engineers in the field of transport infrastructure engineering for their future profession, as well to encourage students to engage in research work and give the option to continue their studies in professional or academic undergraduate study programmes.*
Tasks of the study programme	*Tasks of the study program:* *- to provide competitive education in the field of road and bridge construction by the level of bachelor studies and international standards;* *- to provide students with comprehensive knowledge, develop skills and develop competence following the requirements of the labor market, preparing students for practical work;* *- to ensure the development of the content of the study program, the study process, scientific research work, and changes by the changes in the field of surface transport infrastructure, international practice, and science;* *- to promote students' interest in further professional development, supplementation of academic knowledge, master's studies;* *- to develop student's research skills and promote their use;* *- to stimulate students 'interest in the processes taking place in society, to stimulate students' development into a positive, modern, responsible, ethical, and capable personality who can act independently and make decisions;* *- to develop the research work of academic staff and students and the practical use of the obtained results to promote international mobility and participation in projects.*

Results of the study programme	*Graduates of the study program:* *- to be able to start their future career or to continue their studies in professional or academic study programmes;* *- understand the relevant theories, regularities and technology of transport infrastructure;* *- to be able to do practical tasks in transport infrastructure engineer's profession;* *- to be able to find creative solutions for professional problems;* *- to be able to negotiate and discuss practical issues and solutions with colleagues, customers and leaders;* *- to be able to evaluate and improve the quality of their work;* *- to able to evaluate and improve their own and other persons activities, work in cooperation with others, plan and organize work to carry out certain professional tasks, carry out or supervise the activities where unforeseen changes may occur;* *- to be able to define, describe and analyse practical problems in the field of transport infrastructure engineering, select the necessary information and use it in a clearly defined way to solve problems;* *- to be able to participate in the development of professional area, show that they are aware of the status of their profession in a wider social context.*
Final examination upon the completion of the study programme	*students have to elaborate Bachelor Work and a Transport infrastructure design project.*

Study programme forms

Full time studies - 4 years, 6 months - latvian

Study type and form	*Full time studies*
Duration in full years	*4*
Duration in month	*6*
Language	*latvian*
Amount (CP)	*180*
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 Transportation Engineering*
Qualification to be obtained (in english)	*Transportation Engineer*

Places of implementation

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

Part time extramural studies - 5 years - latvian

Study type and form	*Part time extramural studies*
Duration in full years	*5*
Duration in month	*0*
Language	*latvian*
Amount (CP)	*180*

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 Transportation Engineering*
Qualification to be obtained (in english)	*Transportation Engineer*

Places of implementation

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

3.1. Indicators Describing the Study Programme

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

Professional Bachelor study programme "Transportation Engineering", education classification code 42582; RTU senate decision of 31 April 2003 No. 476; licence of the Ministry of Education and Science of the Republic of Latvia No. 04051-15 issued on 4 July 2003, the first accreditation page of the Ministry of Education and Science of the Republic of Latvia No. 023-695 issued on 8 June 2004, accredited by the decision of the Study Accreditation Committee of the Ministry of Education and Science of the Republic of Latvia on 29 May 2017.

Profile:	Civil Engineering
Level of studies	Professional Bachelor Study Program
Course code	RBCT0
Duration of the study course	4.5 years (9 semesters) full-time studies 5 years (10 semesters) part-time studies
Credit points	180 CP (270 ECTS)
Previous education	General or professional secondary education
Degree awarded	Professional Bachelor Degree in Transportation Engineering and Qualification of Transportation Engineer

During the reporting period from 2017 to 2021, no changes were made to the programme parameters. Professional Bachelor study programme "Transportation Engineering" envisages a study period of 4.5 years for full-time studies and 5 years for part-time studies with a total volume of 180 credit points. Upon completion of the study programme and public presentation of the Bachelor Paper, the student acquires the Professional Bachelor Degree and Qualification of Transportation Engineer.

The content and curriculum of the professional Bachelor study programme "Transportation

Engineering” as well as its main aim are in line with the mission of RTU: to provide the Latvian economy and society with a competitive high-quality scientific research, higher education, technology transfer, and innovation.

The professional Bachelor study programme “Transportation Engineering” replaced the “Highway” specialisation programme that was employed at Riga Polytechnic Institute from 1960 until 2003.

At the moment, this is the only study programme in Latvia that educates and trains transportation engineers and civil engineers at the Bachelor level.

The study programme is not currently being implemented in English, because the faculty has created a wide-ranging academic bachelor's study programme “Civil Engineering”, which is implemented only in English and includes the main subjects of all professional bachelor's programmes being carried out at the faculty. Upon completion of this programme, the student may specialise in transport infrastructure engineering by joining the joint RTU and VGTU academic master's study programme “Innovative road and bridge engineering”, which is also implemented in English.

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

Professional Bachelor study program “Transportation Engineering” has been developed considering the current trends in higher professional education in Europe; it has been designed to be recognizable in Europe, to make sure students acquire both theoretical knowledge and practical skills to be competitive in the European labour market.

The aim of the study programme is to provide education and training to the students so that they acquire professional tertiary education in transportation engineering corresponding to Level 6 of the Latvian Qualification Framework. In the course of professional Bachelor studies, students develop skills and competencies necessary to start independent work in the professional capacity or to continue studies at the professional or academic Master study programmes.

The quality of learning outcomes to be achieved in the course of studies is ensured by the coordinated system of program prerequisites, study aims and tasks. The general principles of the system are defined by RTU Regulations of Studieswww.rtu.lv/content/view/5257/1874/lang,lv/.

The implementation of the programme complies with the Education Development Guidelines 2021-2027 “Future Skills for the Future Society” https://likumi.lv/ta/id/324332-par-izglitibas-attistibas-pamatnostadnem-2021-2027” (in Latvian) and in the course of its implementation, the highest qualification specialists in the field of transportation engineering are educated and trained. The improvement of the Bachelor study programme follows the requirements of the European Qualifications Framework, which complies with the Bologna process and other regulatory enactments.

Applicants with general secondary education or comparable education can enrol in the study

program. On completion of three-year 1st level professional studies in Transportation Engineering, RTU students can also enrol in the program. Matriculating RTU students with 1st level professional higher education in Transportation Engineering to professional Bachelor studies, the courses acquired before are granted credits.

The enrolment procedure for Bachelor studies is regulated by “Regulation on enrolment to undergraduate academic and professional study programmes” approved by RTU Senate (https://www.rtu.lv/lv/studijas/uznemsana/uznemsanas-noteikumi/uznemsanas-noteikumi-pamatstudijas) (in Latvian).

Aims of the study program:

1. a) to educate and train competitive engineers in the field of Transport Infrastructure Engineering capable of performing professional duties,
2. b) to prepare students for independent research work and give them the opportunity to continue their studies at professional or academic Master study programs.

Tasks:

- to provide competitive Bachelor education in the field of road and bridge construction meeting quality requirements stipulated by the international standards;
- to provide the students comprehensive knowledge, develop skills and competencies in accordance with the requirements of the labour market, to prepare students for practical work;
- to ensure development and improvement of the study program curriculum, study process, research activities accounting for the changes in international practice and research in the field of road transport infrastructure;
- to promote students’ interest in further professional advancement, development of their academic knowledge and motivate them to continue studies at Master level programs;
- to develop student's research skills and facilitate their practical application;
- to raise students’ interest in the current social processes, stimulate students’ personal development to become positive, modern, responsible, ethical and active people who may independently act and make decisions;
- to promote research activities by academic personnel and students and support the practical implementation of the research results, to promote their international mobility and participation in the projects.

As a result of mastering the study programme, a graduate will be able (planned learning outcomes):

- to be able to start their future career or to continue their studies in professional or academic study programmes;
- understand the relevant theories, regularities and technology of transport infrastructure;
  to be able to do practical tasks in the transport infrastructure engineer's profession;
- to be able to find creative solutions for professional problems;
- o be able to negotiate and discuss practical issues and solutions with colleagues, customers and leaders;
  to be able to evaluate and improve the quality of their work;
- to be able to evaluate and improve their own and other personal activities, work in cooperation with others, plan and organize work to carry out certain professional tasks, carry out or supervise the activities where unforeseen changes may occur;
- to be able to define, describe and analyse practical problems in the field of transport infrastructure engineering, select the necessary information and use it in a clearly defined

way to solve problems;
- to be able to participate in the development of the professional areas, show that they are aware of the status of their profession in a wider social context.

The aims, tasks and learning outcomes of the professional Bachelor study programme "Transportation Engineering" are interlinked and their reachability is very high.

The Professional Bachelor Studies programme "Transportation Engineering" foresees full-time studies of 4.5 years or part-time studies of 5 years with a volume of 180 KP. After completing studies and defending the work of a bachelor, a student acquires a professional bachelor degree in transportation engineering and a transportation engineer diploma (profession standard PS 0237 Transportation engineer (2004).

The study programme is professional; thus, it always offers learning field trips and exchange of practical information at the enterprises and practical classes to improve skills and competencies of students according to the set learning outcomes of the study programme.

The study programme promotes the implementation of the leitmotif of Riga Technical University (RTU) as defined in its 2021-2025 Strategy: "High quality and effectiveness – the 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 study systems built on research, innovation and cooperation with the industry. RTU educated and trains European and global-level engineers – leaders: developers of new technologies." (https://www.rtu.lv/writable/public_files/RTU_rtu_strategijas_2020._2025._gadam_21.12.2020_1_.pdf) (in Latvian).

The study programme fully complies with the development aim of RTU Faculty of Civil Engineering – to become an internationally recognized leading Latvian educational, research and development institution in the field of civil engineering, providing high-quality study process, internationally recognized research and sustainable innovation, commercialization and knowledge transfer for economic development.

Programme code 42582 complies with Cabinet of Ministers Regulation No 322 Latvian Classification of Education. The first and second levels of classification, represented by the first two digits of code 42, are Second-level vocational higher education (fifth-level vocational qualification and professional bachelor's degree) or Second-level vocational higher education (fifth-level vocational qualification), to be followed by general or vocational secondary education. The third, fourth and fifth levels of classification (thematic groups, subject areas and programme groups), denoted by the next three digits 582, are Civil Engineering (58 stands for Architecture and Civil Engineering).

The study programme shall be implemented in full-time and part-time studies. Part-time studies include an average of 50 students who combine work in the industry with an increase in the level of education. There are various reasons why students choose such an educational path in the changing legislative world. The latest changes to the Construction Law prevented some building specialists from taking engineering positions. By means of distance training, part of building specialists with a college diploma may increase their education by obtaining a civil engineer diploma.

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

The aim of the EU transport policy is to ensure high mobility for people and enterprises in the Europe Union, including Latvia. This means accessible and high-quality transport and transportation infrastructure solutions, free movement of people, goods, and services, improvement of social and economic unity, as well as assurance of the competitiveness of the European economy. Transport flows in Europe are dominated by road transport. It serves all Europeans (even those who do not travel, for the food and other goods are delivered via road transport). Road transport accounts for 83% of passenger transport in the EU and 46% of all freight transport. Society's biggest and most long-term investments are aimed at the construction of transport infrastructure; therefore, high qualification specialists are necessary, who can design roads, bridges, other transport structures, manage construction projects, maintain these structures in working order, conduct scientific research, and develop new theories and methods of civil engineering.

Professional Bachelor study program "Transportation Engineering" has been developed considering the current trends in higher professional education in Europe; it has been designed to be recognizable in Europe, to make sure students acquire both theoretical knowledge and practical skills to be competitive in the European labour market.

Education in the field of Civil Engineering at Riga Technical University (RTU) is implemented by the Faculty of Civil Engineering (FCE). It is implemented at the state accredited study programs at the four consecutive levels of academic education and professional qualification development. The first and second levels (college program and professional Bachelor studies) provide education necessary to perform professional activities in the field, the third and fourth levels (Master and Doctoral) – to perform research and pedagogical activities. Each education level provides education, which corresponds to the respective employment opportunities in accordance with the requirements of the State Professional Standard.

Professional Bachelor study program "Transportation Engineering" consists of a set of lectures, practical classes and independent literature studies. Students obtain in depth knowledge within technical and economic study courses relevant for the field of transportation engineering, as well as courses in humanities and social sciences.

In the process of its improvement, the changes in the transportation engineering in Latvia and in the whole of Europe have been studied in recent years. The main emphasis has been placed on the introduction of new technologies to the study process, as well the training of the students to use construction information modelling which is included now in the study courses. The EU construction information modelling (CIM) representatives stress that CIM is a new opportunity of a digital age to increase quality and productivity in construction; therefore, introduction of CIM is vital to the study programme. Using CIM approach makes construction more reliable and productive, for it allows a more effective use of resources – both human and financial resources. Many study courses are interconnected and the learning outcomes of one course refer to the tasks of the next course. They are interconnected through the principle of construction information modelling. For example, the learning outcomes of the course BTB454 "Highway" (study project 1) are directly related to the tasks of the course BTB353 "Highway Building".

The study programme is being improved to make it appealing for young professionals. Research and analysis are carried out considering other universities across different European regions in order to improve the study programme as comprehensively as possible. The study courses within the study programme are based on general trends in construction industry – they are included in

the study courses, also the general professional understanding of the study courses needed to be mastered by the professionals in the field is also covered. The study programme is modern and follows the latest trends outside Latvia, as well as it is specific enough in Latvia to claim that it has its own well-defined place in the family of other study programmes in the field of engineering sciences.

The academic staff of the programme regularly follow and update the study courses so that they are based on the achievements and acknowledgements of the respective field of science. Course descriptions will be approved by the Programme Director and the Head of Department prior to the start of each semester to keep abreast of academic staff workload and possible development. The teaching staff also update the content of study courses in accordance with the trends of scientific development, using information available in the databases of scientific articles - EBSCO, Emerald, Scopus, Web of Science, etc. Academic personnel are motivated to publish the results of their research, especially in the scientific databases SCOPUS and Web of Science, with a royalty for each article published in these databases. The results of the academic staff development are evaluated each year during the annual appraisal and the results are used to plan further professional advancement of each member of the academic staff.

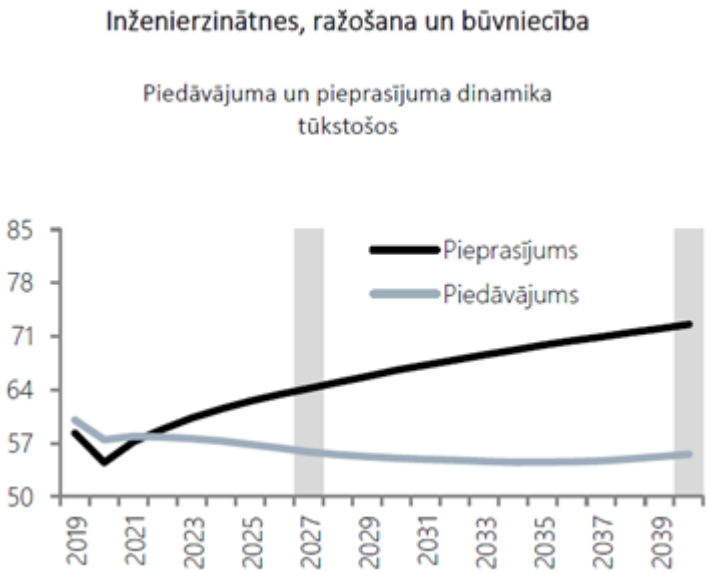
The National Road Construction Programme for 2014-2023, approved at the Cabinet of Ministers, includes projects for capital investments of 1486.8 million EUR. This allows for a positive forecast on graduates' employment prospects.

On 1 January 2021, 73,073,749 km of roads and streets were registered in Latvia. The average density of the road network is 1,132 km per km^2. The total length of national roads is 20,177,686 km. The average density of the national road network is 0.312 km per km^2. Over the last five years, the share of road sections in poor condition in the national road network increased by 10% on average. The overall quality of roads continues to deteriorate. At present, 55% of the state roads have not been repaired in the required time. With the current insufficient level of financing for road maintenance and development, with the increase of traffic intensity and the share of heavy vehicles, there is constant road network deterioration and an irrational growth of expenditure for road users, as well as an increase in the number of traffic accidents. In 2019, 30.48% or 2,805.99 km of roads with black pavement were classified as deteriorated and required rebuilding of the pavement (in 2015 – 25%, in 2016 – 24%, in 2017 – 24.3%). In 2019, 42% or 4,681 km of state roads with gravel cover were classified as deteriorated. They need to be rebuilt.

The budget allocated for the improvement of roads and bridges in poor technical condition and for the design and construction of new transport structures allows looking positively at the future development of the industry and forecasting an increase in the demand for new transportation engineers over the next six years.

The Informative Report on Medium and Long-term Labour Market Forecasts for 2020 of the Ministry of Economics indicates that in 2030 the demand for labour will exceed the level of 2019 by 4.7% and will make up one fifth of the total number of employees in the economy. This in turn will boost the employers' interest in recruiting new employees with knowledge in digital technologies, computer science, as well as people with analytical thinking skills. The demand for workforce will grow in only three sectors – commercial services, construction and manufacturing, see Figure 2.1.1.

Fig, 2.1.1. Supply and demand development dynamics (emzino_03062020-with-annexes1)



This means that our trained specialists with higher education will be in high demand in the labour market.

Furthermore, the study programme is improved after evaluation of the final examinations, as representatives of employers regularly take part in the work of Graduate Paper Examination Committees to assess the knowledge acquired by students within the study programme. Participating in the work of the Graduate Paper Examination Committees representatives from the industry can express their suggestions concerning the desired topics for student research in demand in the labour market. These recommendations are taken into account while improving the courses of the study programme for the next academic year.

When conducting a survey of students at the defence of a bachelor's job with engineering projects, 98% of students have found jobs in speciality and are already working. A considerable lack of engineer personnel characterises the transport infrastructure engineering sector in Latvia.

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

The number of enrolled students during the reporting period is shown in Figure 1.2.1.

The fluctuations in the number of students are due to the following:

- Overall number of school graduates decrease.
- Uncertainty with the development rate and direction of the construction industry.

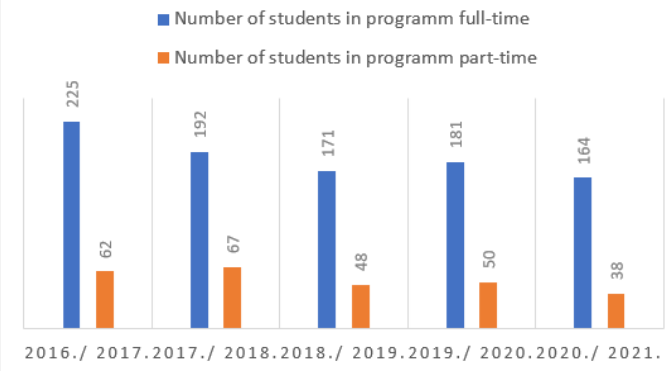


Fig. 1.2.1. The number of students in the reporting period.

The division of graduates by the academic year during the reporting period is shown in Figure 1.2.2.

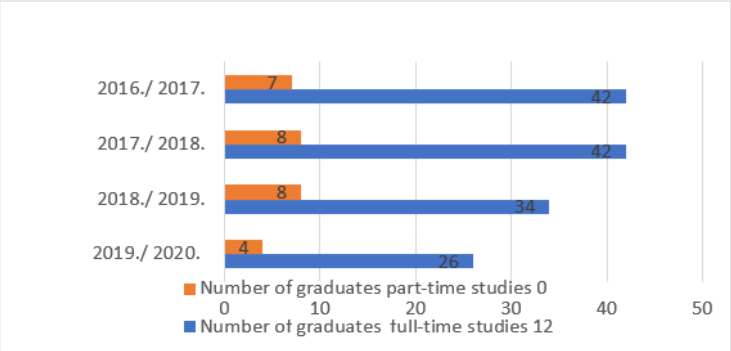


Fig. 1.2.2. A number of graduates in the reporting period.

During the reporting period, 203 Bachelor Papers with engineering projects were publicly presented, and 203 students received a Professional Bachelor Degree in Transportation Engineering and Qualification of Engineer in Transportation Engineering.

Figure 1.2.3 shows the fluctuations in the number of students enrolled in the professional Bachelor study program in the recent study years.

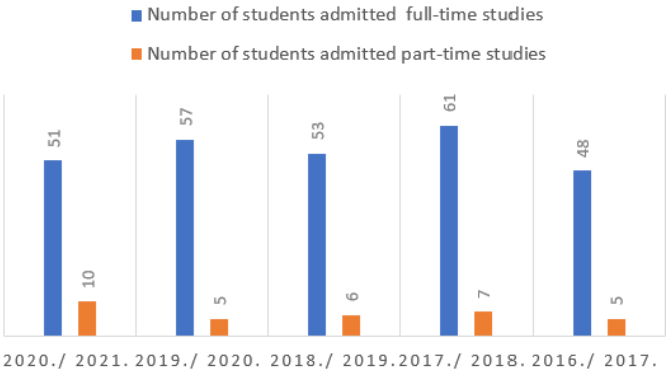


Fig.1.2.3. The number of enrolled students in the reporting period.

The costs of professional Bachelor studies are covered by the state budget. Foreign students are required to pay tuition fee. The number of foreign students is increasing at RTU. During the reporting period, Assem Yeslambekova, a student from Kazakhstan, completed the study programme “Transportation Engineering” in English. Latvian is the main language of instruction at the professional Bachelor study programme; however, when high-level professors are invited, (for example, prof. Gintaris Kaklauskas from VGTU, prof. Darius Bačinskas from VGTU) the lectures are conducted in English.

The data over the reporting period allow concluding that the drop-out rate among students at the

Bachelor study programme is not high. On average, it does not surpass 15% -25% of the overall number (see Figure 1.2.4).

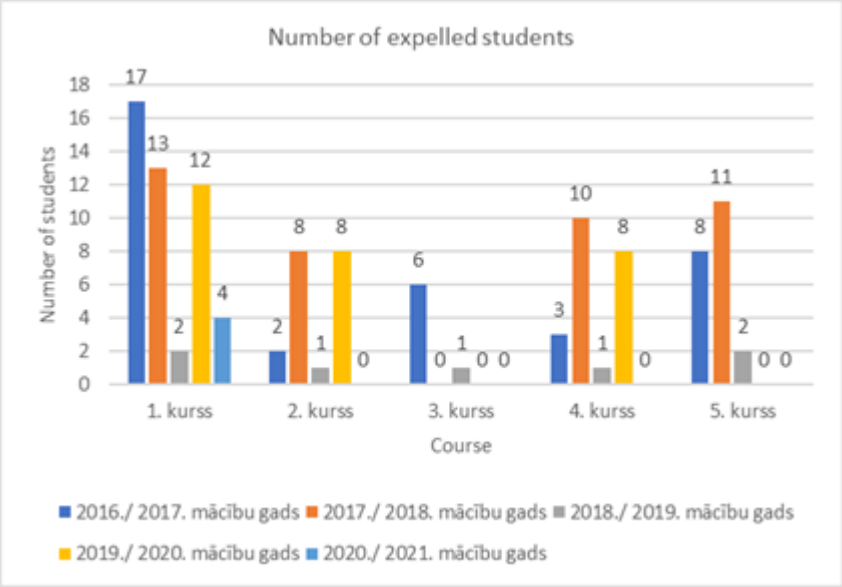


Fig. 1.2.4. The drop-out rate of students in the reporting period.

The main reasons for dropping out are the following: low grades (50% of cases); personal decision (15% of cases); discontinued studies after the academic leave (35% of cases) and other reasons. Despite the aforementioned reasons, the sector of transportation engineering is rapidly developing (billion-euro worth project Railbaltic has started), which in turn allows forecasting that the study programme can expect a steady student enrolment.

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

3.2. The Content of Studies and Implementation Thereof

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

The content of the professional Bachelor study programme “Transportation Engineering” complies with the regulatory enactments of the Republic of Latvia, RTU internal regulations, Development Strategy of RTU and that of the Faculty of Civil Engineering, as well as contributes to the achievement of the United Nations Sustainable Development Goals (SDGs).

The Professional Bachelor Study Program “Transportation Engineering” envisages the acquisition of general education courses, professional specialization courses, humanities and social science courses as well as second foreign language courses in the relevant specialty area. Within the framework of free option, other study courses are also available. As the study program also incorporates practical placement and Bachelor Thesis including project, having completed the Program the graduate has fulfilled requirements of Transportation Engineer Occupational Standard and can be considered a fully-fledged professional with the Occupational Classification Code: 2142 29 “Transportation Engineer” with the 5th qualification level.

The Occupational Standard determines that a Transportation Engineer is a highly qualified specialist who can design roads, bridges and other transport structures, manage construction projects, maintain these structures in good condition; can perform structural calculations, demonstrate the knowledge of building materials technology and construction management; can organize and manage building site resources in a professional and cost-effective manner – can plan and supervise the construction and operation process: can check the project documentation, plan cooperation of all stakeholders involved in the object construction and supervise the execution of construction work, give the necessary orders to subordinates and construction project implementation participants and check the execution of orders, make sure that the construction work is carried out in accordance with the requirements of construction project, norms and standards within a certain time limit and in compliance with the approved estimate; can plan the necessary measures for quality assurance as well as occupational and traffic safety on site; can draw up and control structure execution documents; monitor and analyse the performance of construction work and develop work organization and implementation projects at the technological level appropriate for building codes, efficiently and effectively use resources, demonstrate knowledge of the operation of construction structures, can conduct scientific research and develop new construction engineering theories and methods.

Within the study programme, themes of theoretical papers and practical tasks are regularly related to current trends in the industry. Research and creative work results are regularly reflected in scientific journals and conference materials. The Faculty of Civil Engineering regularly publishes the Baltic Journal of Road and Bridge Engineering https://bjrbe-journals.rtu.lv/, which is included in the SCOPUS and WEB of Science databases. Every year, the academic staff of the Faculty of Civil Engineering publishes dozens of articles in various local and international scientific journals and presents more than 20 papers at local and international scientific conferences. The variety in topics showcases a broad range of interests among staff members, which ensures informativeness and a creative diversity in the study process.

The professional Bachelor study programme “Transportation Engineering envisages the study period of 4.5 years for full-time studies and 5 years for part-time (extramural) studies with the total volume of 180 CP. The information included in the study courses comes from the aims of the study courses and the learning outcomes, which in turn follow from the aim of the programme and the learning outcomes. The link is clearly visible from the mapping of the study programme (see Annex 8).

All study courses in the programme are divided into 6 blocks:

Section A (118 CP) – Compulsory study courses divided into sub-sections – basic study courses, basic profession-oriented theoretical courses and IT study courses, as well as professional specialization study courses.

Section B (17 CP) – Compulsory elective study courses divided into sub-sections – professional specialization study courses, study courses in humanities and social sciences, and languages.

Section C (6 CP) – Elective study courses.

Section D (20 CP) – Internship.

Section E (19 CP) – Final / state examinations, which include a Bachelor Paper including an engineering project.

Each study course has a defined aim and learning outcomes to be achieved. All knowledge, skills and competences in the study course are related and subordinated to the aims and expected learning outcomes of the study programme. The plan of the study programme is given in Annex 9, the descriptions of the study courses – in Annex 10. Each study course provides acquisition of 1 through 5 programme outcomes. Each programme outcome corresponds to at least 1 study course, but on average these are 5 or more courses.

Prior to the start of an academic term, each member of the academic staff has to examine the course description, assessing the existing aims of the course and the expected learning outcomes, and has to examine the learning materials and literature, make sure that the literature is up-to-date and includes the advanced research in the field. Analysis of compliance of the curriculum of the study programme "Civil Engineering" to the state standards allows concluding that the programme complies fully to the requirements. For compliance of the study programme to the state education standard see Annex 6 and for compliance of the study programme to the professional standard see Annex 7. To provide the cross- complementarity of the study courses, as well as to avoid duplication, the academic staff discusses regularly the structure of the study programme. The descriptions of the study courses are available on ORTUS platform, so the academic staff has access to descriptions of other study courses which ensures their interconnection.

Period from 2019 until 2021 marked the reconstruction of the building of the Faculty of Civil Engineering, which resulted in a modern building and new laboratory premises.

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

Not relevant!

3.2.3. Assessment of the study programme including the study course/ module implementation methods by indicating what the methods are, and how they contribute to the achievement of the learning outcomes of the study courses and the aims of the study programme. In the case of a joint study programme, or in case the study programme is implemented in a foreign language or in the form of distance learning, describe in detail

the methods used to deliver such a study programme. Provide an explanation of how the student-centred principles are taken into account in the implementation of the study process.

Professional Bachelor Study Programme “Transportation Engineering” has been developed so as to ensure the successful development of knowledge, competencies and skills on the basis of individual and group work, as well as continuous communication between the student and the instructor.

The study courses are evaluated in accordance with the RTU Senate Decision of 29 March 2010 "On the Regulations for Evaluation of Learning Outcomes", the RTU Senate Decision of 25 May 2001 "On the Criteria for Evaluation of Learning Outcomes " and the RTU Senate Decision of 29 January 2001 "On the Transition to a Unified Evaluation of Study Results" in a 10-point system (10 - excellent, 1 - very, very poor). The examinations consist of tests, study papers and exams according to the study plans approved for each semester.

Learning outcomes for each study course are defined separately, they are included in the Study Course Description that is published in the RTU Study Course Catalogue. Each instructor within their study course tests the knowledge, skills and competencies of the students specified in the course description (papers, tests, presentations, independent works, case study analyses, group works, etc.). The final grade is the sum of all test papers and examination grades, the percentages of which are also indicated in each course description and presented to students at the beginning of the semester.

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 the semester. Criteria for assessment of the study courses and individual/home tasks are published in ORTUS portal beforehand. During the semester, the assessment for each home task, test, report, presentation and any other task is ascribed a 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 by 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 program and learning outcomes are taken into consideration.

Student-cantered teaching and learning principles are observed within the Professional Bachelor Study Programme “Transportation Engineering”. The approaches used during studies promote the achievement of the aims and learning outcomes of the study courses and programme. Students have an opportunity to influence their study process, remain autonomous, submit feedback on the study process, aligning it with their expectations. It must be noted that learning and training guidelines are defined in the RTU Code of Academic Integrity, Regulation on the Assessment of Learning Outcomes, the methodological guidelines for the development of the study papers and the thesis, etc.

Examinations and tests set by the program allow making sound conclusions about the level of knowledge and skills of each student assessing their progress in the long term. In order to improve student academic performance and raise their interest in acquiring comprehensive knowledge, FCE runs an annual competition among the students for the opportunity to continue studies on the state budget funds. The only criterion is - student’s academic achievements in the previous period.

The Bachelor study programme with a large share of individual work, which respects the differences

among the students taking into account the academic background and experience of each student, as well as research activities, very well meets the principles of student-centred learning. It allows concluding that the courses within the study programme are student-centred. Implementation of the study programme is carried out using different modes of the study course implementation. Students work in small groups, but at senior courses - through individual work, which allows applying appropriate and diversified pedagogical approaches. The study process is organized in a way to encourage the autonomy of students, simultaneously providing support to the member of the academic staff in their capacity of scientific supervisor a mentor.

Successful performance of the internal education quality assurance system at RTU is ensured at the following levels:

At the level of the Office of Vice-Rector for Academic Affairs, internal education quality assurance is performed by the Study Department, which:

- provides operations and control of RTU Study Course (SC) Register, monitoring whether the study course corresponds to the requirements of the respective tertiary education program and its content;
- surveys students at the university level to discover how successfully first-year students have adapted to the university system, to find out the level of student satisfaction with the study process, lectures, practical classes and academic staff, as well as ensures that survey results are available to RTU Study Department, each member of academic staff, heads of departments, Deputy Dean for Studies and a responsible person at the Office of Vice-Rector for Academic Affairs;
- ensures relevant premises and technical support to general lectures (100 – 200 seats).

At the level of RTU faculties:

- once a year, the head of the study programme submits a report to the Council of the faculty, prior to that assessing and ensuring the relevance of the study program at the Faculty Study Field Commission;
- student self-government is involved in the overall quality assurance process of the study program. Representatives of the student self-government actively participate in the work of decision-making bodies: RTU Academic Assembly, RTU Senate, RTU Senate Commissions and Faculty Council.

At the department level:

- each semester the administration of the study programme analyses the results of the student survey on the quality of academic staff performance and overall assessment of the study program. The results are discussed at the department meetings, meetings of the Faculty Study Field Commission and Faculty Council meetings;
- once per academic year annotations to the study course within the study program, course syllabi, methodological resources, the list of literature and the guidelines for the development of the course works (reports, papers, internship reports and graduate papers) are reviewed;
- courses and seminars for faculty members are regularly organized to address such issues as the newest teaching and pedagogical methods. Members of academic personnel are motivated to attend qualification advancement courses;
- academic personnel and administration of the study program participate in various experience exchange activities, cooperating with universities from other countries, meeting

representatives of the industry and entrepreneurs, discussing topical industry issues and student research work and projects;
- departments continuously monitor that the quality of the premises and equipment meets quality requirements and update the resources as necessary.

Additional quality assurance system accounting for the specifics of the study field is implemented **within the study programme**:

- regular monitoring of student individual performance (responsible authority – academic staff);
- regular reporting of performance results in the RTU Study Management System (responsible authority – faculty record management department);
- regular monitoring of the study program implementation process (responsible authority – program administration);
- regular discussion with the student self-government and program administration on the detected drawbacks and risks related to the study process (responsible authority – student self-government);
- regular updating individual courses and themes accounting for the newest discoveries and trends in the research field (responsible authority – Faculty Study Program Council);
- arbitration mechanism (responsible authority – program administration).

Learning outcomes for each study course are defined separately and are included in the study course description, which is published in RTU Study Course Catalogue.

Examination and credit test questions are prepared by the instructor responsible for the study course based on the approved description of the study course and the study program. Examination questions are formulated to ensure that a student is capable of comprehensively answering them thus demonstrating that they have fully covered course content. Tests are carried out in accordance with the requirements stipulated in effective RTU regulations.

Assessment of student advancement and their performance is conducted through the entire period of program implementation. At the seminar's students submit their works to the instructor and develop their presentation skills and competencies. Tests envisioned by the program allow making sound conclusions about the level of knowledge and skills of each student assessing their progress in the long term. Presentations of course papers are public and are aimed at developing students' discussion skills.

The study process for full-time and part-time students is organised differently. Full-time student study organized Civil Engineering Faculty and designed on a weekly basis, with a daily list of lessons and an audience of appropriate size attached. Part-time studies shall be organised by the Department of External and Part-Time Studies. The study process is organized on Saturdays and involves a larger scale of self-contained work. The scope of the study programme and the requirements for evaluating the acquisition of study courses are the same for full-time and half-time students.

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

outcomes of the study programme (if applicable).

The Professional Bachelor Study Programme “Transportation Engineering” includes Internship in the volume of 20 CP.

Internship is an integral part of a professional study programme, which is to be done according to LR regulations, the resolution of RTU Senate of 29 April, 2002 “On the structure of the second-level professional study programmes” and the resolution of RTU Senate of 28 January, 2019 “On organization of internship at Riga Technical University, new edition”.

The aim of the internship is to participate in the work of an organisation, get acquainted with company’s technical and technological equipment, compile technical specifications and informative material, complete practical tasks, which could require the use of the previously acquired knowledge.

A place for internship can be any company or organization, which allows acquiring the basics of civil engineer job related to construction project design, management, technology of construction materials, management of civil works, planning and supervision of civil works, project documentation, procedure of on-site works, experience in working with construction regulations and standards, planning of necessary activities for on-site quality control and labour safety, preparation and control of as-built documentation, supervision and analysis of the works, effective and appropriate use of resources, competence in issues of building operations, use of design software.

Every student, depending on the year of studies, receives an individual task, which must be completed during internship.

If students need it, RTU offers assistance of a student career specialist, who can find a suitable place of internship, but a student also can choose the place of internship individually, which is also the most popular way of finding a place for internship. After that a tripartite cooperation agreement is concluded and the student can proceed to complete the internship tasks within 20 weeks. The agreement mentions contact persons – an internship supervisor at the company and an internship supervisor at the University. The internship supervisor at the University is the Head of the study programme or another person according to the study plan. The internship supervisor at the University provides support during the internship period. After the internship period, the student submits the internship report. Before the submission of the internship report, the internship supervisor reviews the report, gives feedback, and comments regarding the improvement of the report, which enable the student to better prepare for the public presentation. After that, in the presence of the internship supervisor, the student publicly presents the internship results to the group of fellow students. Internship is evaluated according to a 10-point grading scale.

Professional internship influences the overall learning outcomes, for it is one of the final stages before the elaboration of the Bachelor Paper and the engineering project; therefore, during the internship the student must demonstrate the knowledge defined in the study programme, apply the skills and acquired competences. The internship shows student performance to a greater extent than individual study courses.

The internship tasks included in the study programme are individual and are closely related to the analysis and assessment of the learning outcomes of the study programme. Within the study programme, internship mentors and supervisors support the students in the achievement of the set tasks by means of regular communication and internship supervision.

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

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

Professional Bachelor Study Programme “Transportation Engineering” includes a final examination – a Bachelor Paper including an engineering project in the volume of 19 CP.

The final examination is specific research in the field of transportation engineering (part of the Bachelor Paper) and an engineering part in which a road or bridge project must be developed.

At the final examination, a student should demonstrate their professional and research skills according to the professional standard and State Regulation on Higher Level Professional Education. The student should demonstrate the ability to design roads and bridges, conduct construction calculations, use modern construction materials and technology, develop construction process planning and supervision projects, draw up a paper according to the requirements for qualifications papers, present it in public in front of the committee and defend the solutions stated in the project.

The final examination procedure implies development of a Bachelor Paper including an engineering project. The topic of the Bachelor Paper and the project shall be approved by a scientific adviser and the head of the department. Students choose the fields of their Bachelor Papers from the sample topics suggested by each department; or, more often, they solve problems relevant to the industry or company according to the latest internship. The academic staff member of the department or an engineer in transportation engineering holding a Bachelor or Master degree can be a scientific adviser of the Bachelor Paper.

A student and their scientific adviser also agree upon the calendar plan, but each department has its own control terms, taking into account that both autumn and the spring academic terms consist of 16 academic weeks.

The theme of the Bachelor Paper and engineering project is chosen during the 8th semester, and by the end of the semester a literature review of the theme under consideration must be compiled as well as a topographic plan provided for the development of an engineering project in the volume of 6 CP. In the last, 9th semester, student work is regularly controlled: in 5 weeks, 50% of the total work must be completed; in 12 weeks – 75%; and after 16 weeks – the Bachelor Paper and engineering project must be submitted to the State Examination Committee for public presentation. Student must receive scientific adviser’s approval for the viva voce examination. In case the student has not completed all the requirements imposed by the scientific adviser, or in case of excessive plagiarism (> 30%), the viva voce examination is not allowed.

Before the Viva Voce, the paper is reviewed by reviewers approved by the order of the head of the Department of Roads and Bridges. The Viva Voce Examination is public, it is evaluated by the State Final Examination Committee approved by RTU Rector, which includes representatives of professional civil engineering associations and companies.

Examples of the themes of recent Bachelor Papers:

- Modelling of the Service Life of Reinforced Concrete Bridges and Analysis of its Influencing Factors.

- Analysis of the Level of Safety of Single-Level Road Junctions in Saldus.

- Analysis of the Possibilities of Implementing “Shared Space” Traffic Organisation in Latvia.

- Methods of Risk Assessment of Bridge Structures.

- Analysis of the Possibilities of Using Wild Animal Repellent Equipment on Latvian Roads.

- Analysis of Road Elements Suitable for Racing Tracks.

- Analysis of Road Traffic Safety Level in Jekabpils.

- Analysis of Recycled Asphalt Preparation Technologies.

- Analysis of the Possibility of Using Concrete Pavement in Road Junctions.

- Investigation of Asphalt Concrete Frost Resistance according to Fatigue Resistance and Stiffness Criteria.

- Development of a Modified Asphalt Mixture of Nanomaterials to Increase the Durability of Road Surfaces.

- Road Life Cycle Analysis.

- Multi-Criteria Decision-Making Method in Road Design.

Analysing the wide range of topics, it can be concluded that both teaching staff and students demonstrate their skills, knowledge and competences at a very high level and in line with the topicality of the field. The choice of topics is based on the student's interest in current developments in the field and on the student's preferences for future career choices, and the final thesis topics owe to the sustainability and development of the programme as a whole.

In the reporting period, final grades for the graduate papers were in the range from grades 6 to 10. The final grade is made of the grade ascribed by the reviewer, which contributes 50% to the grade, and the evaluation of the Viva Voce Examination Committee, which contributes the other 50%.

3.3. Resources and Provision of the Study Programme

3.3.1. Assessment of the compliance of the resources and provision (study provision, scientific support (if applicable), informative provision (including libraries), material and technical provision, and financial provision) with the conditions for the implementation of the study programme and the learning outcomes to be achieved by providing the respective examples.

RTU Faculty of Civil Engineering (FCE) continuously monitors compliance to quality requirements of rooms and technical equipment, the appropriate lecture halls with necessary multimedia hardware have been equipped. In order to ensure the qualitative study process, FCE is carrying out extensive refurbishment works, upon their completion the Faculty will meet international standards for campuses and lecture halls. Classification of the premises is given in the table below.

Room type	Number of rooms	Useful area m²
Meeting room	1	70.91
Computer rooms	4	243.77
Auditoriums	23	1702.34
Teachers' rooms, cabinets	69	1523.61
Assistant professor / Doctoral student premises	5	196.24
Workspace / workshop	6	172.19
Research facilities	6	350.53
Laboratories	35	1256.83
Resource room	6	213.53
Auxiliary room	11	197.99
Anteroom	3	35.89
Student self-government and record keeping	3	260.43
Kitchen	1	16.43
Total		**6240.69**

FCE institutes provide education and learning support: develop and update descriptions of the study courses, implement the corresponding study courses (including practical and laboratory works and seminars), supervision and defence of the graduate papers, and other activities related to learning, teaching and research work.

In 2017 – 2020, substantial investments were made in the research infrastructure. For example, the Institute of Transport Engineering had acquired such equipment as a Hamburg testing device (automatic Hamburg two-wheel tracker), as well as a roller-compactor, a four-point fatigue testing machine (four-point beam bending machine), a drone with infrared camera for open-air drone-based measurements and reading, as well as a high-resolution camera for additional imaging. In 2021, the Institute of Materials and Structures in cooperation with the largest manufacturer of construction materials in Latvia – “Sakret” Ltd., established a new laboratory – 3D concrete printing laboratory equipped with a 3m x 3m concrete 3D printer. In 2020, FCE founded the Centre for Digital Building Technologies that carries out active research and training in Building Information Modelling (BIM).

The Scientific Library of RTU (https://www.rtu.lv/en/studies/scientific-library) (in Latvian) is an academic library of state significance, which has obtained its status as a result of library accreditation. The Scientific Library of RTU provides the necessary information for RTU study

process and research activities, performs library, bibliographic and information services for RTU students, teaching staff, and employees. The Library's collection includes 1.4 million printed documents and e-resources in the databases relevant to RTU fields.

In 2016, significant investment was made in the development of the library infrastructure, with the construction of an additional 2240 m2 of space for the Central Library. The total area of the library premises is 6393 m2, of which 3417 m2 are for reader services. There are 713 workstations for library users. The library has four group rooms and six individual cubicles, a Western reading room and a conference room. The library is accessible to users with reduced mobility.

To improve the work of the Scientific Library of RTU and to ensure the availability of information needed for study and research work, the Library Council has been established, which decides on the replenishment of the library's collection with printed publications and subscriptions to the necessary databases. The Library Council has approved the "RTU SL Collection Completion Policy", which defines the basic principles of collection formation and development in accordance with the directions of RTU study and scientific activities.

When RTU provides funding for the library, the funding for information resources for each study programme is calculated. The collection is replenished according to the recommendations of the heads of study programme, researchers, and the allocated funding. The desired titles can be ordered by contacting the Library's Collection Development Department, ordering on the Library's website, filling in the order form, filling in the application form, by phone or by visiting the Library. The Scientific Library offers a guide to ordering titles and e-resources, which brings together the websites of various publishers and bookshops in Latvia and abroad.

Database subscription contracts are concluded both directly with the supplier and through the "Cultural Information Systems Centre" state agency, which is the Latvian national representative of the international non-profit organisation EIFL (Electronic Information for Libraries, http://www.eifl.net/). The EIFL Licensing Programme offers national libraries subscriptions to internationally recognised databases at significantly reduced subscription fees not offered to individual subscribers, thus saving financial resources of the libraries.

The database subscriptions maintained by RTU Scientific Library (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.

- Databases financed by the Ministry of Education and Science available to RTU Scientific Library: ScienceDirect, SCOPUS (Elsevier), Web of Science.

- Latvian databases: LETA, Letonika, the Database of Latvian Standards (available on the premises of the Library).

Database usage at the Scientific Library of RTU has been growing since 2016. E-resource loans have increased from 75,391 to 525,194 items.

The new library premises have allowed to extend the range of services. Since the opening of the new premises in 2018, the number of visits to the library has increased from 103,825 to 235,600. The Scientific Library of RTU is open to everyone. The Central Library is open to users from Monday to Saturday. There is a 24/7 reading room. During the summer period, the Central Library is open every weekday with reduced opening hours. (https://www.rtu.lv/lv/studijas/biblioteka/pakalpojumi-3) (in Latvian).

The library's sources are housed in an open-access collection. Books and periodicals according to the field of study and the UDC indexes are located in the central building of the Scientific Library, 5 Paula Valdena Street, Riga. The last copies of the oldest publications corresponding to the RTU profile are kept in the library repository. They are always available to the users.

The librarian on duty helps visitors find their way around the collection. Bibliographers (information specialists) provide more detailed information and advice. The library has a branch librarian service (https://www.rtu.lv/lv/studijas/biblioteka/nozaru-informacija) (in Latvian).

The library resource search is supported by the Primo Discovery search tool (https://www.rtu.lv/lv/studijas/biblioteka/vienota-informacijas-meklesana) (in Latvian). It allows searching the library catalogue (https://kopkatalogs.lv/F/?func=find-b-0&local_base=rtu01), the subscribed databases, as well as databases created by the RTU Scientific Library (https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/bibliotekas-veidotas-datubazes) (in Latvian) in one interface. Searching for information in the electronic joint catalogue (https://kopkatalogs.lv/F), it is possible to simultaneously obtain information on the resources available in 12 Latvian libraries. Both the electronic catalogue and the RTU portal ORTUS allow remote reservation of library resources, as well as remote access to the databases. Since the introduction of RFID technology, users can use five self-service book-dispensing machines and check out books from the pick-up machines around the clock.

The library provides students, academic personnel and other stakeholders with various levels of individual consultations and group training in information literacy (https://www.rtu.lv/lv/studijas/biblioteka/lietotaju-apmacibas) (in Latvian).

Publications not available in the library are delivered via an interlibrary loan or an international loan.

Internet access is available throughout the library. The library has copying, scanning, printing, binding services and a self-service dining room.

Students, whose permanent residence is outside Riga or Pieriga, are offered accommodation at RTU hotels. These services are also available for incoming students and guest professors. In addition, RTU has also cooperation agreements with other accommodation providers to offer guests the desired level of comfort, if necessary.

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

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

each language, type and form of the study programme implementation).

Both state budget financing and student funds will be used for the implementation of the study programme. Information on the expected financial resources of the programme is presented in Table 3.1.1.

Table 3.1.1. Study Programme Funding

Academic year	State budget funding for the programme, EUR	Tuition fees, EUR	Total study programme funding, EUR	Cost per student, EUR
2016./2017.	394712,41	61440,31	456152,72	3866,02
2017./2018.	390551,22	52519,99	443071,21	4040,66
2018./2019.	406917,52	62229,36	469146,88	4229,679
2019./2020.	440584,58	46070	486654,58	4405,042

The analysis of the information shows that the state budget grants for the study programme have increased during the reporting period. The cost per student has increased, which is justified by the overall increase in total RTU costs (utilities, building maintenance, etc.).

Information on the minimum number of students in RTU study programmes is provided in the appendix of the self-evaluation report "On a minimal number of students in study programmes".

Information on the funding distribution between the cost items is provided in the appendix of the self-assessment report "Funding distribution between the cost items".

3.4. Teaching Staff

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

The Faculty of Civil Engineering of RTU employs highly qualified academic staff. It can be characterised by the high number of publications during the reporting period. For example, in the period from 2013 to 2020, 757 articles were published in journals indexed in the Web of Science

and SCOPUS databases.

The dynamics of changes in the number of publications by year is shown in Figure 4.2.1.

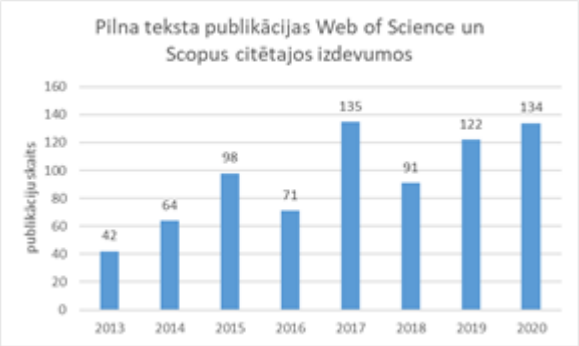


Fig. 4.2.1. Number of full-text publications in the journals indexed in SCOPUS and Clarivate Analytics.

Th following qualitative and quantitative indicators show that the qualifications of the academic staff meet the requirements specified in Article 55 of the Law on Higher Education Institutions - 20 professors and associate professors, approved by the Latvian Council of Science, have been elected to academic positions in RTU departments and are experts in their field, participate in the implementation of the compulsory and the compulsory elective part of the study programme.

Academic staff regularly improve their professional and academic knowledge by participating in methodological seminars, conferences (national and international), conducting scientific and research work, as well as by participating in various projects.

9 professors of the Faculty of Civil Engineering holding a degree of Doctors of Science are involved in the implementation of the study programme:

Professor Leonīds Pakrastiņš obtained a Doctor of Science from Riga Technical University in 2005. Professor Leonīds Pakrastiņš specializes in the research of concrete, composite and masonry structures. He worked in the EUROCODE normative base launch group, is the member of review boards of numerous scientific journals - ASCE Journal of Structural Engineering ISSN: 0733-9445, ELSEVIER Construction and Building Materials ISSN:0950-0618 and Fire Safety Journal ISSN: 0379-7112, the author of 105 publications.

Professor Jevgenijs Barkanovs obtained a Doctor of Engineering degree from Riga Technical University in 1993. Professor Jevgenijs Barkanovs has been specializing in application of the finite element method, as well as in structural dynamics, strength, elimination of oscillations; participated in 10 international projects, the author of 154 publications.

Professor Dmitrijs Serdjuks obtained a Doctor of Engineering degree from Riga Technical University in 2001. Professor has been specializing in pilot testing of structural building elements and structure optimization; the author of dozens of Latvian patents and 122 publications.

Professor Aleksandrs Korjakins obtained a Doctor of Engineering degree from Riga Technical University in 1997. Professor Aleksandrs Korjakins has been specializing in high performance concrete, green construction materials, material recycling and building structure expertise. Professor has actively participated in international cooperation as evidenced by his activity in editorial panels of international journals - Environmental Engineering and Management Journal; Journal of Sustainable Architecture and Civil Engineering, (Lithuania, Kaunas), Journal Advances in Ceramic Science and Engineering (ACSE), Journal Construction & Building Materials (Elsevier), and Zeitschrift für Angewandte Mathematik und Mechanik (ZAMM). He is the author of 210 publications.

Professor Ivars Radiņš obtained a degree of candidate of technical sciences from Latvian State University in 1981, and a Doctor of Engineering degree from Riga Technical University in 1992. Professor Ivars Radiņš has been specializing in analysis of structure dynamics. He is the author of 23 publications.

Professor Ainārs Paeglītis obtained a degree of candidate of technical sciences from Riga Polytechnical Institute and a Doctor of Engineering degree from Riga Technical University in 1992. Professor has been specializing in safety and durability of bridge structures, research of dynamic properties of bridges. Professor Paeglītis is the chief editor of the scientific journal "The Baltic Journal of Road and Bridge Engineering" (https://bjrbe-journals.rtu.lv/). He managed 19 RTU projects, is the author of 91 publications.

Professor Modris Dobelis obtained a degree of candidate of technical sciences from Latvian Academy of Science Institute of Polymer Mechanics in 1985 and a Doctor of Engineering degree from Riga Technical University in 1992. Professor has been specializing in calculation of structures and graphical representation of the results, he was also one of the first in Latvia who started training in the principles of Building Information Modelling. Modris Dobelis has actively participated in international cooperation, for example, in 2002-2008 he was the president of the International Association for Geometry and Graphics BALTGRAF, a member of the editorial panel of the Polish journal "The Journal Biuletyn of Polish Society for Geometry and Engineering Graphics". He is the author of 78 publications.

Professor Atis Zariņš obtained a Doctor of Engineering degree from Riga Technical University in 2006. Professor has been specializing in spatial design and research of cover beam loads, the author of 26 publications.

Professor Juris Smirnovs obtained a degree of candidate of technical sciences from Moscow Automobile and Road Construction Institute in 1989 and a Doctor of Engineering degree from Riga Technical University in 1992. Professor has been specializing in road traffic safety and road coating research. Professor Juris Smirnovs is an editor of the scientific journal "The Baltic Journal of Road and Bridge Engineering", the author of 59 publications.

3 associate professors of the Faculty of Civil Engineering holding a degree of Doctors of Science are involved in the implementation of the study programme:

Associate Professor Līga Gaile obtained a Doctor of Engineering degree from Riga Technical University in 2014. Associate professor took part in the implementation of the National Plan for Introducing Eurocode Standards and development of domestic annexes, as well as in enhancement of technical regulation for building constructions as a member of Eurocode sub-committee of the Latvian Standardization Technical Committee LVS/STK30 "Civil Engineering". The field of research covers the issue of oscillations in complex building constructions she is the author of 51 publications and 1 Latvian patent.

Associate Professor Jānis Šliseris obtained a Doctor of Engineering degree from Riga Technical University in 2013. After obtaining a Doctor degree, the associate professor underwent training at Fraunhofer Institute of Industrial Mathematics (Fraunhofer ITWM), Kaiserslautern. His field of research is related to analysis of the properties of timber materials and development of new composite materials, the author of 3 Latvian patents and 48 publications.

All members of academic staff working at the study programme are listed in the table in the Annex.

Personal achievements of the academic staff in scientific research work as well as their

pedagogical qualification help reach advanced learning outcomes.

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

17 professors – Doctors of Science, whose scientific and academic qualifications corresponds to the regulations on the criteria for the election in the professor position, are involved in the implementation of the study programme.

3 elected associate professors – Doctors of Science, whose scientific and academic qualifications corresponds to the regulations on the criteria for the election in the position of an associate professor, are involved in the implementation of the study programme.

Furthermore, 11 assistant professors and 6 lecturers are involved in the implementation of the study programme.

During the reporting period, the changes were considerable, although 8 members of the academic staff were involved additionally in the programme implementation, however, the number of associate professors has reduced. Analysis showed that this happened for a variety of reasons:

1. The associate professors and assistant professors advanced their qualifications over the reporting period and became professors or associate professors, respectively;
2. The academic staff took part in grant competitions, and received funds and opportunities to conduct the research in the field, thus changing their academic position to a leading researcher position;
3. New industry specialists were recruited to promote introduction of advanced technologies in the study courses; thus, lecturers and assistants came to work in the programme.
4. Retirement;
5. Termination of employment due to commencing work in the construction sector in order to improve own qualification.

The overall changes during the reporting are given in the table:

Academic position	Academic year 2016/17	Academic year 2020/21
Professor	10	17
Associate professor	5	3
Assistant professor	11	11
Lecturer	2	6
Leading researcher	2	0

The table shows that the programme involves new qualified members of the academic staff, thus maximally adjusting the programme curriculum to the specifics and latest development in the

sector.

Currently, RTU is implementing SAM 8.2.2 project on "Strengthening of Academic Personnel of Riga Technical University in Strategic Specialisation Areas" financed by the European Social Fund, one of the tasks of which is the renewal of academic personnel. The aim of the project is to strengthen RTU academic personnel in the areas of strategic specialisation in 10 study fields, including the study field "Architecture and Civil Engineering". The project activities are focused on three areas:

- Involvement of Doctoral students in the work of the academic staff at RTU,
- Involvement of foreign academic staff in the work of the academic staff at RTU,
- Improvement of the existing academic staff qualifications, including academic staff internship at an economic operator.

Within the project, academic staff have an opportunity to develop their competence at the courses in professional English, as well as specialized training courses.

In order to ensure and increase the impact of scientific activities and personnel development, RTU management signs an annual agreement with each RTU faculty, which sets specific quantitative indicators in the areas of studies, scientific activities and valorisation.

Implementing the professional bachelor's study programme requires teaching staff, both with achievements in professional activity – in the design, construction, monitoring and maintenance of roads and bridges, and with advances in science to ensure the academic quality of the study process. For example, in the programme's implementation, we have involved assistant professor Janis Bidzans, who has projected a large part of the streets of Riga and has recognised authority in his sector. On the other hand, the programme is carried out by Professor Atis Zarins, who has perfected the spatial design methods of the roads, studied scientific articles and recognised a scientist. The varying qualifications of teaching staff – professionalism and academic qualifications – allow for creating a balanced team of teaching staff to reach the aims and tasks of study.

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

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

Provide information on the reporting period (if applicable).

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

Within the study programme, there is a cooperation stimulation mechanism for academic staff that provides enhancement and integration of the study courses. Both student survey results and alumni survey results allow getting feedback, which identifies certain shortcomings. Thus, the study courses are improved on a regular basis, considering both student suggestions and industry development trends.

During reconciliation of the study courses, all relevant academic staff are involved, ensuring that the themes considered within the study programme are continuously updated and optimized in cooperation with the associated industry professionals.

Cooperation of the academic staff within the study programme is considered to promote achievement of the learning outcomes. Reviewing and updating the study programme, the academic staff mutually agree on the most appropriate and effective solutions for evaluation of the learning outcomes and achievement of performance indicators. Periodical discussions and review of the study course syllabus help achieve thematically harmonized and complementary training, avoiding duplication of questions discussed in different courses within one study programme.

The rate of the RTU elected and permanently employed academic staff to students at the professional Bachelor study programme “Transportation Engineering” is approximately 1 to 5.

Annexes

III - Description of the Study Programme - 3.1. Indicators Describing the Study Programme		
Sample of the diploma and its supplement to be issued for completing the study programme	diploma paraugs BCT0 ar pielikumu.pdf	diploma paraugs BCT0 ar pielikumu.pdf
For academic study programmes - Opinion of the Council of Higher Education in accordance with Section 55, Paragraph two of the Law on Higher Education Institutions (if applicable)		
Compliance of the joint study programme with the provisions of the Law on Higher Education Institutions (table) (if applicable)		
Statistics on the students in the reporting period	RBCT0 5.pielikums EN.docx	RBCT0 5.pielikums.docx
III - Description of the Study Programme - 3.2. The Content of Studies and Implementation Thereof		
Compliance with the study programme with the State Education Standard	RBCT0 6. pielikums_EN.pdf	RBCT0 6. pielikums.pdf
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard or the requirements for professional qualification (if applicable)	RBCT0 7. pielikums_bakalauri ENG.pdf	RBCT0 7. pielikums_bakalauri.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	RBCT0 8.pielikums ENG.docx	RBCT0 8.pielikums.docx
The curriculum of the study programme (for each type and form of the implementation of the study programme)	RBCT0 9.pielikums ENG.pdf	RBCT0 9.pielikums.pdf
Descriptions of the study courses/ modules	10. pielikums_BCT0_Eng.pdf	10. pielikums_BCT0.pdf
Description of the organisation of the internship of the students (if applicable)	Internship_Management_Procedure.pdf	Prakses_organizesanas_kartiba.pdf
III - Description of the Study Programme - 3.4. Teaching Staff		
Confirmation that the academic staff of the doctoral study programme includes not less than five doctors, of which at least three are experts approved by the Latvian Council of Science in the branch or sub-branch of science in which the study programme intends to award a scientific degree (if applicable)		
Confirmation that the academic staff of the academic study programme complies with the requirements specified in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions (if applicable)		

Heat, Gas and Water Techology (47582)

Study field	*Architecture and Construction*
ProcedureStudyProgram.Name	*Heat, Gas and Water Techology*
Education classification code	*47582*
Type of the study programme	*Professional master study programme*
Name of the study programme director	*Egils*
Surname of the study programme director	*Dzelzītis*
E-mail of the study programme director	*egils.dzelzitis@rtu.lv*
Title of the study programme director	*profesors/ habilitētais doktors*
Phone of the study programme director	
Goal of the study programme	*The aim of the study programme is to educate and train highly qualified and competitive professionals in the field of heat, gas and water technology with an in-depth body of knowledge, skills and competences of managing smart city infrastructure development projects.*
Tasks of the study programme	*- to provide students with in-depth knowledge in the field of heat, gas and water technology and related subject;* *- to develop students' competence and professional skillset corresponding to the field of study;* *- to develop students' ability in technical literature analysis and in conducting individual scientific research work.* *- to develop students' ability to adapt theoretical knowledge in independent and specific task formulation and solving.*

Results of the study programme	*- students are familiar with building engineering systems' and urban infrastructure systems' design, installation and operation requirements as per compliance with local and regional building norms, as well as able to determine the applicable standards to the aforementioned systems and ensure their execution within the framework of one's authority;* *- are able to identify the factors and risks affecting the operation quality of building engineering systems and urban infrastructure systems, as well as able to determine preventive measures with respect to quality risks;* *- are able to assess, manage and develop building engineering systems' and urban infrastructure systems' design, installation and operation processes and their interaction, as well as able to determine their modernization measures;* *- are able to understand the core indicators and operational budget development principles for building engineering systems' and urban infrastructure systems' design, installation and operation processes, as well as plan and project necessary resources for a successful and streamlined operation of a construction firm or a municipal enterprise;* *- are able to determine the required competence level, skillset and responsibility distribution of employees to ensure a successful operation of a construction firm or municipal enterprise;* *- are able to supervise and perform the design, installation and operation of building engineering systems and urban infrastructure systems;* *- are able to develop, implement and upgrade the design, installation and operation of building engineering systems and urban infrastructure systems in accordance with the innovative approaches and principles;* *- are able to carry out research work of a scientific value in the field of design, installation and operation of building engineering systems and urban infrastructure systems, as well as interpret and analyze the acquired results;* *- are able to continue their career in the role of a engineer, as well as continue their academic education in Master study programmes.* *- are able to continue their career in the role of a researcher, university educator or an engineer, as well as continue their academic education in doctoral program.*
Final examination upon the completion of the study programme	*At the end of the study programme, the student has to defend their Master thesis to the State Examination Committee.*

Study programme forms

Full time studies - 1 years - latvian

Study type and form	*Full time studies*
Duration in full years	*1*

Duration in month	*0*
Language	*latvian*
Amount (CP)	*40*
Admission requirements (in English)	*a professional bachelor's degree in heat, gas and water engineering systems and / or a professional qualification of a heat, gas and water technology engineer, or an equivalent education, or a professional bachelor's degree in thermal energy and thermal engineering and / or a professional qualification of a heat energy and heat engineering engineer, or an equivalent education, or professional bachelor's degree in transport construction and / or professional qualification of transport construction civil engineer, or equivalent education*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Professional Master Degree in Heat, Gas and Water Engineering Systems*
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 - 1 years, 6 months - latvian

Study type and form	*Full time studies*
Duration in full years	*1*
Duration in month	*6*
Language	*latvian*
Amount (CP)	*60*
Admission requirements (in English)	*professional bachelor degree in transportation engineering and/or professional qualification of transportation engineer, or comparable education*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Professional Master Degree in Heat, Gas and Water Engineering Systems*
Qualification to be obtained (in english)	-

Full time studies - 1 years, 6 months - latvian

Study type and form	*Full time studies*
Duration in full years	*1*
Duration in month	*6*
Language	*latvian*
Amount (CP)	*60*
Admission requirements (in English)	*professional bachelor degree in heat power and thermal engineering and/or professional qualification of heat power and thermal engineering engineer, or comparable education*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Professional Master Degree in Heat, Gas and Water Engineering Systems*
Qualification to be obtained (in english)	-

3.1. Indicators Describing the Study Programme

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

Professional Master study programme "Heat, Gas and Water Technology", education classification code 47582. Accredited by the decision of the Study Accreditation Commission of the Ministry of Education and Science of the Republic of Latvia, 29 May 2017 - Accreditation certificate No. 2020/39.

The recommendations identified for improvement of the programme in the previous period have been taken into account and the following improvements have been made:

1. To define learning outcomes of the Internship and better integrate them into the study process through academic supervision and appropriate evaluation. Improvements have been made to the internship part of the study programme, i.e., learning outcomes have been defined and better integrated into the study process, as well as academic supervision and appropriate evaluation have been ensured:

- acquiring skills and competences at the place of internship on the basis of the knowledge provided during the specialisation courses;
- development of an engineering project.

Improvements were approved in new wording by the Senate decision as of 28 January 2019 (Minutes No. 526) "On Internship Organisation Procedure at RTU". The description of study courses defines the aims, tasks and the learning outcomes. The supervision implemented by the academic staff in the course of study shall be exercised in the form of tutorials.

2. To increase the amount of training at laboratories to support theoretical studies. The volume of laboratory works has been increased to strengthen the theoretical knowledge. In order to transform the theoretical education into practical skills and develop student competences, extended practical works with measurement, data processing and analysis have been introduced within the study courses "Equipment of Gas Supply Systems", "Heat and Moisture Insulation of Buildings", "Water Treatment Technology", etc. In addition, a new study course "Gas and Oil Transmission Systems" has been introduced in cooperation with JSC CONEXUS. Practical works and regular visits to gas infrastructure facilities have also been organised in cooperation with this company. Students are required to participate in the Scientific Conference of RTU and present a report. New modern specialised software has been introduced into the study process: IDA-ICE; TRNSYS, DEPHIN, THERM.

3. To ensure recognition of the previous non-formal education or professional experience. In cooperation with the Certification Centre of the Association of Heat, Gas and Water Technology Engineers of Latvia, engineers of other related specialisations are offered to acquire individual courses and to apply for a certificate in construction practice. Admission to studies takes place by recognizing Bachelor degree in other fields and by setting requirements for additional courses to be acquired.

4. To develop and implement modules in English to improve international representation of the most recent achievements. A sequential preparation of the study programme for the flow in English is ongoing. The study course modules in English have been developed and provided. For exmaple, study courses in H*eat transfer in building constructions* and *Building heating and ventilation* are delivered to foreign students in another study programs;

5. To ensure implementation of a part of the programme in distance learning mode, particularly for the students in Liepaja and Daugavpils.

- Recognition of previous non-formal education and professional experience has been carried out: the study programmes "Transportation Engineering" and "Heat Power and Thermal Engineering" have been recognised before pursuing studies at the Master programme "Heat, Gas and Water Technology". Procedure has been approved by the Senate decision as of 23 September 2019 (Minutes No. 632) "Procedure for Recognition of Competencies Developed Outside Formal Education or from Professional Experience and Learning Outcomes Achieved in Previous Education at Riga Technical University".
- In cooperation with the Certification Centre of the Association of Heat, Gas and Water Technology Engineers of Latvia, engineers of other related specialties are offered to acquire individual courses and to apply for a certificate in construction practice.
- The study course modules in English have been developed and provided. Study courses in heat transfer in building constructions, building heating and ventilation are delivered to foreign students.
- The development of the programme is based on recent international industry achievements and trends. The study courses shall include knowledge developed in the Federation of European Heating, Ventilation and Air Conditioning Associations (REHVA), as well as information from the results of the activities of the Educational Technology Committee. There is a sustainable link between students and Europe's latest research and development areas.
- Part of the programme has been provided in the distance learning mode: a) The studies continue at Daugavpils Study and Science Centre for the senior years, switching to studies at RTU External and Part-Time Studies Department; b) Availability of study course materials in ORTUS e-learning environment with the online feedback option: during Covid-19, the study process is organised in ORTUS e-learning environment; c) The number of video lectures recorded has increased – in 2020/21 academic year, lectures were recorded and used to organise a distance learning process.

6. There is an urgent need to modernise the laboratory facilities in Liepaja and Daugavpils and to offer students access to the latest technologies in both locations. Liepaja and Daugavpils branches have been restructured; all practical work is taking place in Riga.

7. To improve opportunities for the individual development of the academic staff. Improvement the growth potential of academic staff in the process of implementation (intended to be approved in academic year 2021/2022). During the preparatory phase, the decision of the RTU Senate is being developed based on the Cabinet Regulations No. 129 as of 25 February 2021 "Procedure for Evaluating the Results of the Work of the Applicants for the Positions of Professors or Associate Professors and Assessment of Scientific and Pedagogical Qualifications or Results of Artistic Activity of Elected Professors or Associate Professors" in accordance with Section 34 of Chapter 5 of the Law on Higher Education Institutions – clear benchmarks for professional development have been developed. Academic personnel take advantage of the opportunities of ERASMUS+ programme, as well as in the framework of the budget, take part in experience exchange visits.

8. To extend the working time of the library. The working time of the library has been

extended - the unlimited reach of information is ensured. The library services are available at the Scientific Library of RTU at 5 Paula Valdena Street. Working time is 9.00-19.00 also on Saturdays, during the examination period: throughout the whole day. During the pandemic, by prior appointment, online for receipt/transfer of books 24 hours a day.

9. To improve the premises and equipment as planned. In the execution process, the premises are being restored (in accordance with the plan). Commissioning of the building recommended by the Faculty of Civil Engineering in August 2021. The study programme will be implemented in the renovated premises. The Institute of Heat, Gas and Water Technology has been granted new facilities, including those for practical work. To date, the classrooms allocated to the Institute have been transformed into shared use lecture halls, thereby optimising the capacity of premises. The number of laboratories at the Institute's disposal has increased; new premises for practical work have been created: a ventilation laboratory; a hydraulic systems laboratory; the solar system performance monitoring stand as well as the mobile power supply unit with PV panels. The solar system performance monitoring stand is located on the roof of the laboratory building of RTU.

10. The following amendments were made to the reception requirements (approved in RTU Senate meeting of 27 September 2021 (Protocol No 653):

a. admission requirements for the second implementation option from "professional bachelor's degree in thermal energy and thermal engineering and engineer qualification in thermal energy and thermal engineering, or equivalent education" to "professional bachelor's degree in thermal energy and thermal engineering and/or the professional qualification of an engineer for thermal energy and heat engineering, or equivalent education";

b. requirements for admission to the third version of implementation from "professional bachelor's degree in transport and professional training of engineer in transport buildings or equivalent education" to "professional bachelor's degree in transport and/or professional qualifications of transport engineer or equivalent education".

11. Additional 2 study modules were developed (20 CP each) , a total of 60 CP study courses -1.5 years, which is intended to be acquired for students from other related study programmes but not by a professional bachelor's degree in heat, gas and water engineering /civil engineer of systemengineering. One module for applicants with the RTU diploma in the programme "Heat Energy and Thermal Engineering" and the other for applicants with the RTU diploma under the "Transport Construction" programme, accordingly, graduates may apply for building practice certificates in the field of water supply and sewer systems, including fire-fighting systems, but for the end of the study programme "Heat energy and thermal engineering" to the building practice certificate in the field "heat, ventilation and air-conditioning systems". These certificates shall be issued by the Construction Specialist Certification Centre of the Latvian Union of Heat, Gas and Water Technology Engineers.

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

The Professional Master Study Programme "Heat, Gas and Water Technology" has been developed in accordance with the Law on Higher Education Institutions of the Republic of Latvia and the Classification of Education of the Republic of Latvia.

Programme code 47582 complies with Cabinet of Ministers Regulation No 322 Latvian Classification of Education. The first and second levels of classification, represented by the first two digits of code 47, Second-level professional higher education (professional master's degree or level 5 professional qualification), awarded after obtaining a bachelor's degree, professional bachelor's degree or level 5 professional qualification. The third, fourth and fifth levels of classification (thematic groups, subject areas and programme groups), denoted by the next three digits 582, are Civil Engineering (58 stands for Architecture and Civil Engineering).

The study programme has been developed taking into account strategic objectives of RTU, market supply and potential demand. The programme is implemented in 3 forms - full-time intramural 40 CP (1 year) and 2 additional forms with extra 20 CP modules or 60 CP forms (1.5 years) for students from other programs in Latvian language. Since students in this programme are usually practising engineers who need a building practice certificate, these additional modules are intended for students from other study programmes to acquire all the specified study courses necessary to obtain a certificate at the Latvian Heat, Gas and Water Technology Engineers Union Construction Specialists Certification Centre in "gas and sewer systems, including fire-fighting systems" field or "heating, venting and air-conditioning systems" field. These modules were developed on the basis of recommendations of the Latvian Union of Heat, Gas and Water Technology Engineers.

The title of the study programme, the awarded degree, aims and tasks are interrelated. The curriculum has been systematically designed to enable graduates to pursue careers in the heating, ventilation, air conditioning and gas supply industries as designers, energy-efficiency professionals, engineers, as well as in other positions related to the internal and external engineering systems industry.

Applicants with a Professional Bachelor Degree in Heat, Gas and Water Engineering Systems or the Qualification of Engineer in Heat, Gas and Water Technology, or equivalent education are admitted to the study programme. The programme may also enrol persons who have obtained a fifth-level professional qualification in a sector relevant for the professional Master study programme. Matriculation procedure to Master study programmes is regulated by the RTU Senate approved "Enrolment procedure for academic and professional graduate study programmes".

It is planned to addmit students with a professional bachelor's degree in Heat energy and thermal engineering and/or the professional qualification of a Heat energy and thermal engineering engineer who, without a professional master's programme of 40 CP 1 year, have to acquire an additional study module of 20 CP with specialised study courses. It is also planned to host students with a degree of professional degree in transport and/or professional qualifications of a transport engineer, who should also acquire 20 CP in addition to specialised study courses in order to obtain a certificate of construction specialist in a specific field of specialisation.

It is possible to enrol students with a professional Bachelor degree in another field. In this case, however, a student's individual study plan is drawn up as enrol to include additional study courses on heat, gas and water engineering systems from the professional Bachelor study programme "Heat, Gas and Water Technology".

Graduates of the study programme are able:

- to demonstrate understanding of the requirements of the regulatory enactments for the design, installation and operation of building engineering systems and urban infrastructure systems, as well as to define the standards applicable to those systems and to ensure that

they are implemented within the limits of their authority;
- to identify factors and risks affecting the performance of building engineering systems and urban infrastructure systems, to identify appropriate preventive measures for quality risks;
- to identify, evaluate, manage and improve the design, installation and operational processes of building engineering systems and urban infrastructure systems and their interaction, and to determine the necessary development activities;
- to demonstrate understanding of the basic indicators for the design, installation and operation of building engineering systems and urban infrastructure systems, the principles for establishing the budget for operational activities and to plan the necessary resources in order to ensure successful operation and development of a building company or municipal enterprise;
- to determine the necessary competencies, responsibilities and authority of the employees of the building firm or municipal company in order to ensure and improve efficient operation;
- possess good knowledge of and are able to manage design, installation and operation of building engineering systems and urban infrastructure systems;
- to establish, implement and develop basic principles for the design, installation and operation of building engineering systems and urban infrastructure systems;
- - to carry out research of scientific value in the fields of design, installation and operation of building engineering systems and urban infrastructure systems and to interpret and analyse their results;
- - to develop career of a researcher, lecturer of higher education institution or creative engineer, as well as to continue studies at the Doctoral study programmes.

The study programme is professional; thus, it always offers learning field trips and exchange of practical information at the enterprises and practical classes to improve skills and competences of students according to the set learning outcomes of the study programme. Each individual course is being evaluated based upon unified system, that has been approved by the Senate of RTU. The quantitative indicator is the total credit point (CP) count in the respective course. The qualitative indicator is the 10-point grading system or pass. At the end of the study programme, the student has to defend their Master thesis to the State Examination Committee. The Master thesis has to be written on the relevant subject in the field of heat, gas and water technology. The State examination committee assess the knowledge and competence of the student based on 10-point grading system. Graduates of the study programme will be also able to conduct research in the field of heat, gas and water technology, as well as develop and implement construction projects.

The study programme promotes implementation of the leitmotif of Riga Technical University (RTU) as defined in its 2021-2025 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 educated and trains European and global-level engineers – leaders: developers of new technologies.” (https://www.rtu.lv/en/university/strategy).

The study programme fully complies with the development aim of RTU Faculty of Civil Engineering – to become an internationally recognized leading Latvian educational, research and development institution in the field of civil engineering, providing high quality study process, internationally recognized research and sustainable innovation, commercialization and knowledge transfer for economic development.

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

graduates' employment.

The **Professional Master Study Programme "Heat, Gas and Water Technology"** is consistent with heating, ventilation, air conditioning and gas supply trends in the EU countries and worldwide. During its development, the changes in the construction industry in Latvia and across Europe were studied. The main emphasis has been placed on the introduction of new technologies as well as "green" technologies in the study process and on the use of modeling software as part of study courses for student training.

According to the International Energy Agency data, in 2019 global energy consumption nearly twice exceeded the average growth rate since 2010. The largest final energy consumption in the world, around 40% (2019), is associated with buildings and structures where heating, ventilation and air-conditioning systems are the main energy consumers. Increasing energy efficiency in buildings is closely linked with the modernisation of built-in engineering systems. Therefore, the courses of the study programme are designed to prepare engineers for large stock companies, construction and design firms, as well as local government companies providing urban and other residential infrastructure – heating, gas supply, water supply and sewers, the necessary modernisation, operation and maintenance of engineering systems built into buildings, as well as to educate and train highly-qualified specialists for the projecting of building engineering systems and the coordination of building projects.

The study courses aim at deepening the student's knowledge in the specific area: heat, gas, water, refrigeration or the energy efficiency of buildings.

The study programme is being improved to make it appealing for young professionals. Research and analysis are carried out considering other universities across different European regions in order to improve the study programme as comprehensively as possible. The study courses within the study programme are based on general trends in construction industry – they are included in the study courses, also the general professional understanding of the study courses needed to be mastered by the professionals in the field is also covered. The study programme is modern and follows the latest trends outside Latvia, as well as it is specific enough in Latvia to claim that it has its own well-defined place in the family of other study programmes in the field of engineering sciences.

The academic staff of the programme regularly follow and update the study courses so that they are based on the achievements and acknowledgements of the respective field of science. Course descriptions will be approved by the Programme Director and the Head of Department prior to the start of each semester to keep abreast of academic staff workload and possible development. The teaching staff also update the content of study courses in accordance with the trends of scientific development, using information available in the databases of scientific articles - EBSCO, Emerald, Scopus, Web of Science, etc. Academic personnel are motivated to publish the results of their research, especially in the scientific databases SCOPUS and Web of Science, with a royalty for each article published in these databases. The results of the academic staff development are evaluated each year during the annual appraisal and the results are used to plan further professional advancement of each member of the academic staff.

Based on the information from the Central Statistical Database, it may be concluded that the demand for highly qualified specialists in civil engineering is variable, yet growing spirally, which is impacted directly by the global economic situation, nevertheless in the future it is expected only to increase, thus allowing to conclude that the study programme is important and significant in

promoting economic activities in Latvia and Europe (see Table).

Employed by economic activity								
Economic activity	Number (thsd)							
	2013	2014	2015	2016	2017	2018	2019	2020
Agriculture, Forestry and Fishing	71.9	66.4	71.1	68.7	61.4	63.3	66.3	64.3
Mining and quarrying	2.8	3.7	3.9	3.4	2.3	3.0	3.2	2.7
Manufacturing	125.7	118.8	116.4	123.5	120.9	116.9	115.1	114.5
Electricity, gas, heat and air conditioning supply	**11.7**	**10.0**	**12.6**	**14.0**	**13.1**	**12.3**	**9.4**	**10.7**
Water supply, sewerage, waste management and remediation activities	**6.2**	**5.2**	**7.1**	**8.3**	**9.1**	**7.9**	**6.7**	**6.2**
Construction	67.3	73.2	71.9	66.1	63.1	74.6	81.1	76.5
Information and communication	24.3	26.3	26.0	23.8	28.3	29.0	25.6	31.1
Real estate activities	22.7	20.7	20.7	21.4	19.8	20.4	21.7	19.7
Professional, scientific and technical activities	34.4	36.1	36.2	33.6	39.6	36.3	33.4	37.0
Education	94.6	85.1	83.4	81.7	82.3	83.3	83.3	81.6
Other service activities	16.8	14.7	18.0	19.9	21.0	18.2	16.4	21.2

Furthermore, the study programme is improved after evaluation of the final examinations, as representatives of employers regularly take part in the work of Graduate Paper Examination Committees to assess the knowledge acquired by students within the study programme. Participating in the work of the Graduate Paper Examination Committees representatives from the industry can express their suggestions concerning the desired topics for student research in demand in the labour market. These recommendations are taken into account while improving the courses of the study programme for the next academic year.

When analysing the employment of graduates, it should be noted that they are mainly employed in private companies, municipal development departments and construction boards, design companies, public administrations and other sector-related organisations. These include A/S Rīgas Siltums, A/S Salaspils Siltums, SIA Rigas Ūdens, SIA Valmieras Ūdens, A/S Gaso, A/S Conexus. Many students find a job during their internship, and major part continue to work in their internship after graduation.

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

The **Professional Master Study Programme "Heat, Gas and Water Technology"** in the reporting period was implemented in Latvian on the full-time and part-time basis. However, students' non-interest, facilitated coverage from an part-time form in the future.

Number of students:

As of April 2021, the total number of students at the programme "Heat, Gas and Water Technology" was 27 students, which was ~ 3.8 times less than in 2017 (102 students). In view of the statistics of recent years on the number of students enrolled, it can be argued that the number of full-time students is decreasing.

For more information on the distribution of students, see Annex 5, Figures 1 and 2. The reduction is linked with stricter admission requirements.

Distribution according to the source of funding:

During the reporting period, there were no tuition fee paying students, though the Faculty of Civil Engineering can provide a minimum of 50 tuition fee places at the study programme.

Number of graduates:

In 2019/2020 academic year, 11 graduates were granted a Professional Master Degree in Heat, Gas and Water Engineering Systems (see Annex 5, Figure 3). Compared with academic year 2016/2017 (29 graduates), the number of graduates has declined.

Drop-out:

For a variety of reasons, students were expelled: In academic year 2019/2020, 20 students were expelled, in 2018/2019 – no students were expelled, in 2017/2018 – 49 students were expelled and in 2016/2017 – only 1 student was expelled. For an exact comparison of annual drop-outs, see Annex 5, Figure 4.

The main reasons for student dropout:

- students are not able to pass study courses, for example, in academic year 2016/17 there were no such students, while in 2017/18, 45 out of 49 students were expelled due to academic failure; no students were expelled in 2018/19; and in 2019/2020 13 out of 20 students were expelled due to academic failure;
- students drop out of higher education institution due to social causes/family conditions and do not resume studies after academic leave; the number of students varies from 1-5 students during the reporting period;
- due to the epidemiological situation which affected the study process of the last semester; students admitted that they were unable to fully adapt to remote studies and were unable to complete study courses on time.

It can be concluded that in the majority of cases students were expelled due to academic failure.

But students also renew studies after expulsion due to all above mentioned reasons, which is estimated as a good indicator. For example, in academic year 2016/17, there were 7 students, in 2018/19 – 18 students and in 2019/20 – 6 students. For comparison by academic year, see Annex 5, Figure 5.

The full-time study programme provides the opportunity for full-time students to participate in the Erasmus+ international exchange programme. But given the length of the study of only one year, it is not physically possible for students to take advantage of the opportunities of ERASMUS programme. Two students, however used the opportunities to develop their Master Theses in Norway and Estonia.

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

3.2. The Content of Studies and Implementation Thereof

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

Each study course of the **Professional Master Study Programme "Heat, Gas and Water Technology"** defines the knowledge, skills and competences to be acquired, which contribute to the achievement of the learning outcomes of the study programme. The forms of assessment shall be determined by the academic staff in accordance with the learning outcomes of the study course. Each instructor within their study course tests the knowledge, skills and competences of the students specified in the course description (papers, tests, presentations, independent works, case study analyses, group works, etc.). The final grade is the sum of all test papers and examination grades, the percentages of which are also indicated in each course description and presented to students at the beginning of the semester.

All study courses in the programme are divided into blocks:

- **Part A** (8 CP) – Compulsory study courses divided into sub-sections – basic study courses, basic profession-oriented theoretical courses and IT study courses, as well as professional specialization study courses.
- **Part B** (6 CP) – Compulsory elective study courses divided into sub-sections – professional specialization study courses, study courses in humanities and social sciences, and languages.
- **Part C (0 CP)** - free choice study courses
- **Part D** (6 CP) – Internship.
- **Part E** (20 CP) – Final / state examinations, which include a Master thesis.

The study programme has been developed to comprehensively cover the relevant advancements in heat, gas and water technology industries across the world and Europe. Moreover, the vision of the study programme complies with the State's energy planning document "National energy and climate (NEC) roadmap 2021-2030", that was developed for a long-term energy and climate policy planning. It stipulates Latvian state energy and climate policy principles, goals and actions for the next ten years, taking into account outlined long-term development roadmap.

The content of the study programme ensures gaining comprehensive knowledge in three industries: heat, gas and water technology.

The aim of the study programme is to prepare highly skilled and competitive professionals in heat, gas and water technology industry with an extensive proficiency in smart city infrastructure project development and management. The particular attention is being attributed to building and their engineering system energy efficiency and sustainable operation, i.e., energy and water supply system durability. The study courses are implemented taking into consideration the selected research area of each student.

The curriculum of heat and gas technology programme includes acquiring in-depth knowledge and comprehension of urban and building scale energy supply networks, as well as their future transformation and development. The curriculum of water technology programme includes acquiring in-depth knowledge and comprehension of drinking water preparation, as well as wastewater treatment and waste management.

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 in *ORTUS* portal beforehand. During semester, the assessment for each home task, test, report, presentation and any other task is ascrbed 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 program and learning outcomes are taken into consideration.

Most commonly, to assess knowledge and to demonstrate what one has learned within the study course, tests or assignments are used. Skills are assessed mostly through practical, analytical, creative individual and group assignments that require the student to apply the acquired knowledge in practice. In turn, students demonstrate the acquired competences by presenting, discussing and justifying what they have learned in the course, both orally and in writing.

The acquisition of knowledge, skills and competences within the study programme includes theory, practical examples, lectures, group assignments, interactive discussions, and lectures delivered by guest lecturers from the industry.

The Professional Master Study Programme “Heat, Gas and Water Technology” is implemented on a full-time basis and part-time extramural basis, with the number of examinations being determined by the amount of credit points within each course.

All study courses included in the study programme are implemented in accordance with the course descriptions. The study courses are evaluated in accordance with the RTU Senate Decision of 29 March 2010 "On the Regulations for Evaluation of Learning Outcomes", the RTU Senate Decision of 25 May 2001 "On the Criteria for Evaluation of Learning Outcomes " and the RTU Senate Decision of 29 January 2001 "On the Transition to a Unified Evaluation of Study Results" in a 10-point system (10 - excellent, 1 - very, very poor). The examinations consist of tests, study papers and exams according to the study plans approved for each semester.

A student can only present their graduate/Master Thesis once they have mastered the entire study programme curriculum. Study courses completed with a negative grade must be retaken.

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

The programme “Heat, Gas and Water Technology” has defined in the following areas of scientific

research, which are directly related to the study courses to be implemented (see table):

Research area	(%)
Low-energy buildings	25
Building engineering systems	25
Urban energy supply	25
Urban water supply	25

Themes for theoretical works and practical tasks within the study programme are regularly related to the topicalities of the sector. The results of research and creative works are regularly reflected in scientific journals and conference proceedings.

Every year the academic staff of the Faculty of Civil Engineering publishes dozens of articles in various local and international scientific journals and deliver more than 20 reports at local and international scientific conferences. The variety of themes illustrates the broad spectrum of interests ensuring the informative and creative diversity of teaching work.

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

Each study course of the **Professional Master Study Programme "Heat, Gas and Water Technology"** defines the knowledge, skills and competences to be acquired, which contribute to the achievement of the learning outcomes of the study programme. The forms of assessment shall be determined by the academic staff in accordance with the learning outcomes of the study course. Each instructor within their study course tests the knowledge, skills and competences of the students specified in the course description (papers, tests, presentations, independent works, case study analyses, group works, etc.). The final grade is the sum of all test papers and examination grades, the percentages of which are also indicated in each course description and presented to students at the beginning of the semester.

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 in ORTUS portal beforehand. During semester, the assessment for each home task, test, report, presentation and any other task is ascrbed 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 program and learning outcomes are taken into consideration.

Most commonly, to assess knowledge and to demonstrate what one has learned within the study

course, tests or assignments are used. Skills are assessed mostly through practical, analytical, creative individual and group assignments that require the student to apply the acquired knowledge in practice. In turn, students demonstrate the acquired competences by presenting, discussing and justifying what they have learned in the course, both orally and in writing. The acquisition of knowledge, skills and competences within the study programme includes theory, practical examples, lectures, group assignments, interactive discussions, and lectures delivered by guest lecturers from the industry.

The Professional Bachelor Study Programme “Heat, Gas and Water Technology” is implemented only on a full-time basis with the number of examinations being determined by the amount of credit points within each course.

All study courses included in the study programme are implemented in accordance with the course descriptions. The study courses are evaluated in accordance with the RTU Senate Decision of 29 March 2010 "On the Regulations for Evaluation of Learning Outcomes", the RTU Senate Decision of 25 May 2001 "On the Criteria for Evaluation of Learning Outcomes " and the RTU Senate Decision of 29 January 2001 "On the Transition to a Unified Evaluation of Study Results" in a 10-point system (10 - excellent, 1 - very, very poor). The examinations consist of tests, study papers and exams according to the study plans approved for each semester.

A student can only present their graduate/Bachelor Paper once they have mastered the entire study programme curriculum. Study courses completed with a negative grade must be retaken.

The principles of student-centred education are also taken into account in the implementation of the study process, which is implemented in the following way:

- Student involvement in the study process and its development:

Riga Technical University regularly analyses the questionnaires that each student completes at the end of the semester for each course. The students also organise meetings with the programme director to discuss the positive and negative features of the semester courses, as well as the competence, abilities, attitude and quality of each member of academic staff. In this way, students have the opportunity to influence the study process and contribute to its improvement.

- Respecting students’ abilities: Academic staff take into account and respect student diversity and their needs, using different ways of delivering the programme according to students' capabilities.
- Handling student complaints: The University has appropriate procedures in place to deal with student complaints. The complaints process is channelled through the Programme Director and the Head of Department, the Head of the Department of Studies or even the Vice-Rector for Academic Affairs, if necessary. At the Professional Bachelor Study Programme "Heat, Gas and Water Technology ", students first solve problems with the Programme Director, thus the issues to be solved are addressed in a timely manner. For example, if the Programme Director receives a complaint from students about the inadequacy of a course or the incompetence of an instructor, the next step is to find out the reasons and attend the relevant lectures; if the students' complaint is justified, the instructor is instructed to improve the course or is replaced by an instructor whose competence is appropriate for the course.
- Development of academic personnel competence: Courses and seminars are regularly organised for academic personnel, both on pedagogical methods and on technological possibilities for improving the quality of courses and their own qualifications. RTU regulations stipulate that a member of academic staff should also deliver guest lectures at foreign universities, which also directly increases their abilities and the quality of communication. In

2021, RTU organised the following training for the personnel - training on the e-learning environment (Moodle), use of Zoom and Teams (which significantly increased the mobility of teaching staff due to the epidemiological situation), training on audio-visual systems for remote lectures, as well as regular trainings on RTU information systems (usage of ortus.lv). Any other type of training for elected academic personnel in their field is also supported.

- Teaching and learning methods: Pedagogical methods, ways of teaching, learning and assessment are regularly evaluated. Topical issues are discussed at departmental meetings, at the meetings of the Methodological Council. At the end of the course, students evaluate the performance of each member of academic staff by completing a course evaluation questionnaire. Students have the possibility to apply for personal tutorials, which are organised either systematically every week or by appointment at fixed times. Some courses also use student peer-assessment methods where students engage in group work to facilitate learning.
- Fostering student autonomy: Studies rely on the student's autonomy, while at the same time providing guidance and support from the instructor - the description of each study course specifies the scope and content of students' independent work, as well as the methods of its assessment.

The content of study courses was reviewed periodically, taking into account both the changes in Latvian legislation and the current scientific achievements of the world. The review of the content of the study course shall take place in close cooperation with industry associations. Cooperation with industry associations makes it possible to follow the needs of labour markets. The vast majority of doctoral students work in the sector in parallel. This would allow the continued replenishment of the studio, whose content is filled with the industry's spotlights and needs. The study courses are involved in guest lecturers from the industry, ensuring the close links with the industry. In addition, several international and national working groups are involved in the staff of the Institute. In the course of studies, the inspection of lessons and the control of content shall take place. Study courses foresee the development of course projects in accordance with EU and Latvian regulatory frameworks. The design of course projects shall be managed by certified designers.

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

All forms of Professional Master's degree programme have the same value of practice - 6 CP.

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/lv/studentuserviss/karjeras-centrs-ssc/karjeras-diena (in Latvian). 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/). 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 provision of internship places to students.

The Professional Master Study Programme "Heat, Gas and Water Technology" includes internship in the volume of 6 CP. Internship is an integral part of a professional study programme, which is to be done according to LR regulations, the resolution of RTU Senate of 29 April, 2002 "On the structure of the second-level professional study programmes" and the resolution of RTU Senate of 28 January, 2019 "On organization of internship at Riga Technical University, new edition".

The ***aim*** of the internship is: To develop ability to make decisions based on the obtained data, to assess alternatives and find the best solution.

A place for internship can be any company or organization, which allows acquiring the basics of civil engineer job related to engineering system design, building project management, management of civil works, planning and supervision of civil works, project documentation, procedure of on-site works, experience in working with construction regulations and standards, planning of necessary activities for on-site quality control and labour safety, preparation and control of as-built documentation, supervision and analysis of the works, effective and appropriate use of resources, competence in issues of building operations, use of design software.

If students need it, RTU offers assistance of a student career specialist, who can find a suitable place of internship, but a student also can choose the place of internship individually, which is also the most popular way of finding a place for internship. After that a trilateral cooperation agreement is concluded and internship tasks are carried out during 20 weeks, the agreement states contact persons – an on-site internship supervisor and an internship supervisor at the university. At the university, the internship supervisor is the programme director or other person according to the study plan. The internship supervisor at the university ensures assistance during the internship. Before presentation of the internship report, the internship supervisor at the university reviews it and gives their comments and feedback to the student so that they could amend the internship report and prepare better for public presentation of the report.

Internship includes certain tasks, described in the internship regulation. To achieve an assessment of the internship a student presents the report, which states an internship supervisor's (representative of the internship partner company) assessment, internship log, and defends the internship report within a certain term according to the study schedule.

Professional internship contributes to all learning outcomes, as it is one of the final stages prior to development of a Master Thesis. During the internship, a student has to demonstrate the

knowledge defined in the study programme, apply their skills and demonstrate the acquired competences. Internship can provide better reflection of student's performance than individual study courses.

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

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

The Professional Master study Programme "Heat, Gas and Water Technology" envisages the final examination – Master Thesis in the volume of 20 CP.

The Master Thesis shall contain specific research in the field of heat, gas and water technology, where the student examines a chosen theme/issue and proposes a solution.

At the final examination, a student should demonstrate their professional and research skills according to the professional standard and State Regulation on Professional Master Education. The student should also demonstrate the ability to independently resolve complex scientific and technical issues and to carry out research, analyse literature sources and existing technical solutions, assess the effectiveness of implementation options, and offer alternative solutions.

The procedure of Master Thesis development includes approval of the topic of the Master Thesis with a scientific adviser and the head of the department. Students choose the fields of their Master Theses from the sample topics suggested by each department; accordingly, the head of the department suggests an appropriate scientific adviser competent in the chosen theme of the Master Thesis.

A student and their scientific adviser also agree upon the calendar plan, but each department has its own control terms, taking into account that both autumn and the spring academic terms consist of 16 academic weeks. One of the examples of consulting and paper development: during week 3 of the academic term a student receives from a scientific adviser an approval concerning the list of literature or the description of the structure of the Master Thesis on 1-2 pages. During week 8 of the academic term, the student receives approval of the theme of the Master Thesis from the scientific adviser.

Viva Voce Examination is planned two times a year – at the beginning of June and at the end of October. Prior to Viva Voce, the paper is reviewed by the reviewers appointed by the head of the department. The Viva Voce Examination is public, it is evaluated by the State Final Examination Committee appointed by RTU Rector, which includes both academic personnel and representatives of professional civil engineering associations and companies.

The examples of the themes of Master Theses over the last years are as follows:

- Increasing Energy Efficiency for Gas Boiler Connections.
- Collection and Re-Use of Rain Water in Residential Areas.

- Improving the Biological Oxygen Consumption Method for Characterising the Quality of Waste Water.
- Spectral Filtration Technology for Drinking Water Preparation.
- Optimal Use of Solar Collectors in District Heating Systems.
- Urban Natural Gas Supply during Local Energy Crises.
- Impact of Changing the Heating System Regime on Heating Energy Consumption in Public Buildings.
- Glass Fibre Dump Leachate Purification Technologies.
- Procedures for the Prevention of Identified Damage of Natural Gas Consumption Accounting Meters.
- Solar and Geothermal Energy Sources for Building Heating.
- Criteria for the Determination of the Protection Zone for Transmission Pipelines.
- Impact of Hydraulic Balancing on the Efficiency of the Heating System.

Analysing the wide range of topics, it can be concluded that both teaching staff and students demonstrate their skills, knowledge and competences at a very high level and in line with the topicality of the field. The choice of topics is based on the student's interest in current developments in the field and on the student's preferences for future career choices, and the final thesis topics owe to the sustainability and development of the programme as a whole. In the reference period, the final assessment for graduation papers ranged from grade 6 to grade 10. In 2020, 11 graduates with an average grade of 7.3 completed the programme, of them 4 graduates received grade 8, 5 graduates – grade 7, while 1 graduate – grade 6. In 2019, 11 graduates with an average grade of 7.6 completed the programme: 2 graduates received grade 9, 4 graduates – grade 8, 4 graduates – grade 7, and 1 graduate –grade 6. In 2018, 17 graduates with an average grade of 7.8 completed the programme: 1 graduate received grade 10, 4 graduates – grade 9, 4 graduates –grade 8, 6 graduates – grade 7, while 2 graduates – grade 6. In 2017, 29 graduates with an average grade of 7.9 completed the programme, of them 2 graduates received grade 10, 6 graduates – grade 9, 10 graduates –grade 8, 9 graduates – grade 7 and 2 graduates – grade 6.

3.3. Resources and Provision of the Study Programme

3.3.1. Assessment of the compliance of the resources and provision (study provision, scientific support (if applicable), informative provision (including libraries), material and technical provision, and financial provision) with the conditions for the implementation of the study programme and the learning outcomes to be achieved by providing the respective examples.

RTU Faculty of Civil Engineering (FCE) continuously monitors compliance to quality requirements of rooms and technical equipment, the appropriate lecture halls with necessary multimedia hardware have been equipped. In general, in the FCE building at 6A Ķīpsalas Street 4 computer rooms, 23 lecture rooms, 35 laboratory rooms are available for the needs of the study process. In order to ensure the qualitative study process, FCE is carrying out extensive refurbishment works, upon their completion the Faculty will meet international standards for campuses and lecture halls. Numerous new laboratories will be opened, which will promote development of the practical component of the study courses and introduction of technologies in the study process. The equipment in the existing

premises is also continuously updated. Classification of the premises is given in the table below.

Room type	Number of rooms	Useful area m²
Meeting room	1	70.91
Computer rooms	4	243.77
Auditoriums	23	1702.34
Teachers' rooms, cabinets	69	1523.61
Assistant professor / Doctoral student premises	5	196.24
Workspace / workshop	6	172.19
Research facilities	6	350.53
Laboratories	35	1256.83
Resource room	6	213.53
Auxiliary room	11	197.99
Anteroom	3	35.89
Student self-government and record keeping	3	260.43
Kitchen	1	16.43
Total		**6240.69**

Of these, the following facilities shall be provided for the Institute of Heat, Gas and Water Technology:

Way of using premises	Number of premises	Useful area m ²
Laboratory – simulator	1	66.43
Laboratory – heating and renewable systems	1	68.05
Venting laboratory	2	70.3
Resource room/ doctoral candidate room	1	32.95
Employee room	6	95,04
Meeting room/on-line lecture room	1	32.61
Computer class/classroom	1	66.95
Laboratory – water system	1	70.91
Offices	1	15.67
Total		**337.29**

The study process will mainly be provided by the academic personnel and technical staff of the Faculty of Civil Engineering in cooperation with the following RTU organisational units:

- Department of Engineering Mathematics;
- Department of Chemistry;
- Department of Engineering Pedagogy and Psychology;
- Department of Territorial Development Management and Urban Economics;
- Department of Thermal Energy Systems;

- Department of Architectural Design.

Institutes within the structure of the Faculty of Civil Engineering provide study and methodological work: develop and update descriptions of study courses, ensure the implementation of relevant study courses (including practical, laboratory classes and seminars), supervision and public presentation of graduate papers, and carry out other activities related to teaching, methodological and scientific work.

Significant investment in study and research infrastructure was made between 2017 and 2020:

- multi-functional venting stand with the possibility to perform practical work in the field of balancing and automation, as well as testing the effects of different filters on pressure drop and electricity consumption;
- heating system stand with different system balancing capabilities;
- mobile power supply unit with solar panels and accumulators;
- small-sized climate chamber for analysis of phase change material parameters.

The Scientific Library of RTU (https://www.rtu.lv/en/studies/scientific-library) is an academic library of state significance, which has obtained its status as a result of library accreditation. The Scientific Library of RTU provides the necessary information for RTU study process and research activities, performs library, bibliographic and information services for RTU students, teaching staff, and employees. The Library's collection includes 1.4 million printed documents and e-resources in the databases relevant to RTU fields.

In 2016, significant investment was made in the development of the library infrastructure, with the construction of an additional 2240 m2 of space for the Central Library. The total area of the library premises is 6393 m2, of which 3417 m2 are for reader services. There are 713 workstations for library users. The library has four group rooms and six individual cubicles, a Western reading room and a conference room. The library is accessible to users with reduced mobility.

To improve the work of the Scientific Library of RTU and to ensure the availability of information needed for study and research work, the Library Council has been established, which decides on the replenishment of the library's collection with printed publications and subscriptions to the necessary databases. The Library Council has approved the "*RTU SL Collection Completion Policy*", which defines the basic principles of collection formation and development in accordance with the directions of RTU study and scientific activities.

When RTU provides funding for the library, the funding for information resources for each study programme is calculated. The collection is replenished according to the recommendations of the heads of study programme, researchers, and the allocated funding. The desired titles can be ordered by contacting the Library's Collection Development Department, ordering on the Library's website, filling in the order form, filling in the application form, by phone or by visiting the Library. The Scientific Library offers a guide to ordering titles and e-resources, which brings together the websites of various publishers and bookshops in Latvia and abroad.

Database subscription contracts are concluded both directly with the supplier and through the "Cultural Information Systems Centre" state agency, which is the Latvian national representative of the international non-profit organisation EIFL (*Electronic Information for Libraries*, http://www.eifl.net/). The EIFL Licensing Programme offers national libraries subscriptions to internationally recognised databases at significantly reduced subscription fees not offered to individual subscribers, thus saving financial resources of the libraries.

The database subscriptions maintained by RTU Scientific Library

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

azes) (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.
- Databases financed by the Ministry of Education and Science available to RTU Scientific Library: ScienceDirect, SCOPUS (Elsevier), Web of Science.
- Latvian databases: LETA, Letonika, the Database of Latvian Standards (available on the premises of the Library).

Database usage at the Scientific Library of RTU has been growing since 2016. E-resource loans have increased from 75,391 to 525,194 items.

The new library premises have allowed to extend the range of services. Since the opening of the new premises in 2018, the number of visits to the library has increased from 103,825 to 235,600. The Scientific Library of RTU is open to everyone. The Central Library is open to users from Monday to Saturday. There is a 24/7 reading room. During the summer period, the Central Library is open every weekday with reduced opening hours. (https://www.rtu.lv/lv/studijas/biblioteka/pakalpojumi-3) (In Latvian)

The library's sources are housed in an open-access collection. Books and periodicals according to the field of study and the UDC indexes are located in the central building of the Scientific Library, 5 Paula Valdena Street, Riga. The last copies of the oldest publications corresponding to the RTU profile are kept in the library repository. They are always available to the users.

The librarian on duty helps visitors find their way around the collection. Bibliographers (information specialists) provide more detailed information and advice. The library has a branch librarian service. (https://www.rtu.lv/lv/studijas/biblioteka/nozaru-informacija).

The library resource search is supported by the Primo Discovery search tool (https://www.rtu.lv/lv/studijas/biblioteka/vienota-informacijas-meklesana) (In Latvian)**.** It allows searching the library catalogue (https://kopkatalogs.lv/F/?func=find-b-0&local_base=rtu01), the subscribed databases, as well as databases created by the RTU Scientific Library (https://kopkatalogs.lv/F/4C5KSDKLGLAM78XH9H6QKD7YDJ3S5FY9I4MBRFNLS5V2XQTHJR-30668?func=option-update-lng&P_CON_LNG=ENG) in one interface. Searching for information in the electronic joint catalogue (https://kopkatalogs.lv/F/4C5KSDKLGLAM78XH9H6QKD7YDJ3S5FY9I4MBRFNLS5V2XQTHJR-32190?func=option-update-lng&P_CON_LNG=ENG), it is possible to simultaneously obtain information on the resources available in 12 Latvian libraries. Both the electronic catalogue and the RTU portal ORTUS allow remote reservation of library resources, as well as remote access to the databases. Since the introduction of RFID technology, users can use five self-service book-dispensing machines and check out books from the pick-up machines around the clock. The library provides students, academic personnel and other stakeholders with various levels of individual consultations and group training in information literacy (https://www.rtu.lv/lv/studijas/biblioteka/lietotaju-apmacibas) (In Latvian) Publications not available in the library are delivered via an interlibrary loan or an international loan. Internet access is available throughout the library. The library has copying, scanning, printing, binding services and a self-service dining room.

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

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

Only state budget financing is used for the implementation of the study programme. Tuition fees are set in line with the National Audit Office's warning that tuition fees for students studying with budget students cannot be less than the public funding for this service. Part-time extramural studies do not receive State funding, so tuition fees are set taking into account a number of factors, such as the programme's ability to cover its costs, the market situation, demand for the programme, the stage of development of the programme, etc.

Information on the expected financial resources of the programme is presented below:

Academic year	Subsidy to the programme, EUR	Cost per student, EUR
2016/2017	145 114,86	5 799,03
2017/2018	163 575,02	6 060,99
2018/2019	170 429,74	6 344,52
2019/2020	111 064,02	6 607,563
2020/2021	184 942,42	6 694,22

The analysis of the information shows that the state budget grants for the study programme have decreased during the reporting period, while the cost per student has increased, which is justified by the overall increase in total RTU costs (utilities, building maintenance, etc.).

Funding shall be provided in accordance with the methodologies of the Ministry of Education. In view of the fact that the study programme has been implemented for more than 15 years, a framework for infrastructure was established to ensure the profitability of the programme already at a total number of studies, 50. All students have access to Autodesk software, COMSOL, IDA-ICE, DELPHIN etc. The RTU development grants are restored to the training infrastructure. Free programs and demo versions are widely used. ERASMUS programmes include training content and guest lecturers.

The cost of the semester consists of: room, staff, technical and laboratory equipment.

Average room costs for the period to be analysed were EUR 32500 per semester; staff costs EUR 36700 per semester; equipment 7200. The total costs shall be 76400. Consequently, the cost of the premises is 42%, the remuneration is 48% and the equipment is 9%. The purchase of teaching facilities is centrally provided by the RTU Library.

The minimum number of contact hours per semester is 400. On the assumption that hourly costs amount to EUR 40 (including all taxes), the minimum amount of funding required for remuneration is EUR 16 000 per course and EUR 80 000 for all courses per semester (100800 together with the Master's degree programme). For this, costs don't take into account the methodical work of academic staff.

Overall, the funding actually available is less than necessary. This difference is offset by the active scientific work of staff and the associated financing from the industry. As an example, cooperation with one of Latvia's largest companies, CONEXUS A/S. The funding is used to combine content and teaching for the employees of the company. As well as the involvement of staff in ERASMUS activities to ensure that the content of training is improved.

Information on the minimum number of students in RTU study programmes is provided in the appendix of the self-evaluation report "On minimal number of students in study programmes".

Information on the funding distribution between the cost items is provided in the appendix of the self-assessment report "Funding distribution between the cost items".

3.4. Teaching Staff

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

The following qualitative and quantitative indicators show that the qualifications of the academic staff meet the requirements specified in Article 55 of the Law on Higher Education Institutions - professors and associate professors have been elected to academic positions in RTU participate in the implementation of the compulsory and the compulsory elective part of the study programme.

Academic staff regularly improve their professional and academic knowledge by participating in methodological seminars, conferences (national and international), conducting scientific and research work, as well as by participating in various projects.

12 academic staff members of the **Institute of Heat, Gas and Water Technology**, of which **7** professors, **2** associate professors and **2** assistant professors have been involved in the implementation of the study courses at the Master study programme.

Responsible teaching staff:

- Airisa Šteinberga.

- Alīda Zigmunde.
- Uldis Kamols.
- Anatolijs Borodiņecs.
- Andrejs Koliškins.
- Egīls Dzelzītis.
- Guntis Klīve.
- Jānis Rubulis.
- Jeļena Tihana.
- Kristīna Kokina.
- Romāns Neilands.
- Tālis Juhna.

The academic person's qualifications obtained by consulting projects in the industry help to maintain the quality of studies at a modern, high level, by selecting examples for analysis in study courses and by developing the final works of study programmes. Academic staff of the Institute of Heat, Gas and Water Technology have multilateral knowledge and skills in both practical and scientific fields. Most of the acadenmic staff are certified specialists in the field of construction, this makes it possible to supplement the content of the study programme with practical materials, such as real projects. Part of the teaching staff works in leading energy and water supply companies, which allow training tours and practices. In addition, 40% of the teaching staff are experts of the Latvian Academy of Science, what certify the competence of the teaching staff in the latest scientific literature.

Brief bios of the members of academic staff responsible for field-specific study courses and their assistants:

Professor, Dr.sc.ing. Anatolijs Borodiņecs obtained a Doctoral degree in engineering from Riga Technical University in 2007. Since 2013, he has been a Professor at the Institute of Heat, Gas and Water Technology, Riga Technical University. Borodiņecs is the author/co-author of 73 SCOPUS indexed publications, SCOPUS h-index is 9, Google Scholar h-index – 12. Scietific adviser of several theses for Doctoral, Master and Bachelor degrees. He is an expert of the Latvian Council of Science in Engineering and Technology – Construction and Transportation Engineering; Environmental Engineering and Power Engineering. He has a long-term experience in preparing and delivering lectures and training courses. The main research areas of Prof. Borodiņecs are energy efficiency and construction thermal physics. He is a participant and leader of several Latvian and international projects. Major recent projects: H2020 Deep nZEB Modular Retrofitting and ERDF Energy-Efficient Solutions for Unclassified Buildings. He has recently participated in INTERREG, Seventh Framework Programme projects and Horizon 2020 projects. A. Borodiņecs has been awarded FULBRIGHT scholarship for research at the Indoor Environment Center of Department of Architecture Engineering, the State University of Pennsylvania. Since 2013, he has been reviewing articles in ELSEVIER journals and has been an editorial board member of the SCOPUS-indexed journals, as well as has been participating in industry-leading international conferences. Since 2015, A. Borodiņecs has been holding REHVA FELLOW status. He is also a board member of the Latvian Association of Heating, Ventilation and Air Conditioning Engineers and a member of ASHRAE. He is a certified HVAC designer as well as an energy auditor. He is a Deputy Chair of the Doctoral Council “RTU P-12”.

Professor, Dr.sc.ing. Tālis Juhna obtained a Doctoral degree in engineering at Lulea Technical University, Sweden, in 2002. Since 2002, he has been a Professor of Riga Technical University and the head of study programmes. Since 2012, he has been Vice-Rector for Research at Riga Technical University. Member and founder of the Board of Conelum (2017). Member and Deputy Chair of the Council of Rīgas ūdens, Ltd. (2021). Head of the Advisory Board of the Latvian Council of Science

(2021). Additional education: Cambridge, United Kingdom, drawing up of the European Union framework projects, financial aspects (2007). Riga Coaching School, Manager Leadership Courses (2020). Scientific research areas: ensuring water quality in the urban environment and generating energy from wastewater and renewable natural resources. He has established a Water Research Laboratory, which conducts research on drinking water purification, distribution systems, water quality and the formation of microorganism biofilm in the grid. He has developed an innovation implementation and deployment system at Riga Technical University, creating a variety of support mechanisms (e.g., RTU Design Factory) for development of new technologies. Head and member of the research programmes of the International and Latvian Council of Science, Ministry of Education and Science, etc. Published works: More than 100 scientific works in Latvian, Russian and English, including scientific monographs and patents, have been published. The author of several textbooks. Member of editorial boards of scientific journals and the author of more than 60 (cited>540 times, Scopus Hirsch Index 14) scientific articles published in journals and conference proceedings. Pedagogical work: supervised several Doctoral Theses, including those within a joint study programme with KTH; scientific consultant and scietific adviser of Doctoral Theses; has delivered study courses and has been the head of study programmes. Juhna is the Head of the Study Programme “Biotechnology and Bioengineering” jointly implemented by Riga Technical University and the University of Latvia. He has developed a number of courses to foster student innovation skills (e.g., Vertically Integrated Projects, Demola). Organisational work: He is the Vice-Rector for Research at RTU and supervises around 500 scientists at all institutes. He has introduced the funding distribution system of RTU. A member of the boards of several science centres, science councils and business incubators (e.g., the Green Technology Incubator). Currently, he is leading the COVID-19 liquidation project coordinating 9 scientific institutions (Latvian Institute of Organic Synthesis, Institute of Electronics and Computer Science (EDI), Institute of Solid State Physics of the University of Latvia (CFI), RTU, etc). Expert: He has worked as an expert on the evaluation of many projects (e.g., EU Framework Programmes) and as a consultant for the development of water engineering projects. Expert of the Latvian Council of Science: Engineering and Technology – Construction and Transportation Engineering. The Chair of the Doctoral Council “RTU P-12”.

Professor, Dr.sc.ing. Arturs Lešinskis has researched the development of ventilation and air-conditioning systems of large public buildings, as well as a number of important building AVK projects have been developed and implemented under his leadership. A. Lešinskis is the Chairman of the Board at Laffivents Ltd., one of the leading microclimate and automated management solution companies in Latvia. A. Lešinskis has been elected Honorary Academician of the Latvian Academy of Agricultural and Forestry Sciences, as well as Professor of Latvia University of Life Sciences and Technologies and RTU; hundreds of civil engineers have been trained under his leadership, Master and Doctoral Theses have been developed under his supervision. Professor of Riga Technical University and of Latvia University of Life Sciences and Technologies A. Lešinskis is socially active, has been a Chairman of the Board of Certification Centre of the Association of Heat, Gas and Water Technology Engineers of Latvia. A.Lešinskis’ activities have been welcomed by a series of awards – Latvian Academy of Sciences (LAS); JSC Latvijas Gāze and RTU Development Fund Award for Lifetime Contribution to Science; Award for the Education and Training of Young Civil Engineers by the Latvian Association of Civil Engineers; Award for Lifetime Contribution to the Development of the Heat Technology Industry in Latvia by the Certification Centre of the Association of Heat, Gas and Water Technology Engineers of Latvia; Grand Award of the Construction Industry 2014 for Lifetime Contribution to the Construction Industry; as well as at the international level in 2015 the Federation of European Heating, Ventilation and Air Conditioning Association REHVA Professional Award in Recognition of Outstanding Achievements in Technology and for Contribution to Improve Energy Efficiency and the Indoor Environment of Buildings. A. Lešinskis is also a member of the Latvian Association of Heating, Ventilation and Air-Conditioning

Engineers, Latvian Association of Civil Engineers and ASHRAE. He is a certified HVAC constructor and project expert of the State Construction Control Bureau (SCCB). Member of LAS Terminology Sub-Commission. Chairman of the State Examination Committee of the vocational higher education of the Faculty of Environment and Civil Engineering, Latvia University of Life Sciences and Technologies. In 2018, participated in an international HVAC expert working group in France to develop a standard for COPILOT Building Commissioning Solutions. 7 SCOPUS publications, SCOPUS h-index 1.

Professor, Dr.sc.ing. Romāns Neilands obtained a Doctoral degree in engineering in 2010 (Riga Technical University). During his study, Prof. Neilands studied not only waste water treatment, but also focused on hydraulics in treatment tanks, which was one of the key factors to ensure purification. Since 2015, he has been holding the position of Professor at the Institute of Heat, Gas and Water Technology, the Department of Water Engineering and Technology, RTU. The main areas of research are biological and physical-chemical processes for waste water treatment and their provision. Below, there are examples of research themes where Prof. Neilands has participated as a researcher: Hydraulic Modelling during Leaching for Engineering Structures; Creation of a Mass and Energy Database for Waste Water Treatment Plants (Excel, Access); Simulation of the Waste Water Treatment Process (StarPro, BioWin, AquiIfas – Models ASM and Bio_Denitro, Bio-P). While working at Riga Technical University, the Department of Water Engineering and Technology, Professor participated in the research programmes: RTU & LR Environmental Technology Competency Centre for modelling and research of the biological treatment of waste water of JSC Valmieras stikla šķiedra, JSC Grindeks. Over the past 15 years, he has developed his competence in the EU environmental and engineering legislation, established cooperation with consultancy companies from Plancenter, Poyry (Finland), Halcrow (the United Kingdom), Tauw (the Netherlands), Sweco (Sweden), BCEOM (France), as well as has been Deputy Head for Technological Affairs at Rīgas ūdens, Ltd. – in charge of Riga City waste water treatment process and the quality of the treated waste water in the biological treatment station “Daugavgrīva”. Expert of Employers’ Confederation of Latvia (LDDK): development of the Environmental Engineering Programme. Prof. Neilands is a co-author of 28 scientific publications, including 9 SCOPUS publications.

Associate Professor, Dr.sc.ing. Andris Krūmiņš obtained a Doctoral degree in engineering from Riga Technical University in 2009. Since 2017, he has been holding the position of Associate Professor at the Institute of Heat, Gas and Water Technology, RTU. The main areas of research are the energy efficiency of buildings, building management and automation systems, energy-efficient management of building engineering systems, energy monitoring and its importance. Has more than 20 years of experience in the construction, building, servicing of control systems, automation and telemetry systems. Expert of the European Copilot Certification System for Building Automation Development Group. Scientific leader of the project “Improving the Energy Performance of Buildings, Supplementing the Artificial Intelligence of the Management Automation System with a Real-Time Simulation Environment and Self-Generating Algorithms” of Lafivents Ltd. carried out within the framework of the Transport Energy Competence Centre of the Smart Engineering Systems. A. Krūmiņš is also a member of the board of the Association of Heat, Gas and Water Technology Engineers of Latvia, a certified designer of electrical installations, a manager of construction works. 8 SCOPUS publications, SCOPUS h-index 2. The Grand Award of the Construction Industry 2014 to the Engineer of the Year.

Associate Professor, Dr.sc.ing. Jurģis Zemītis acquaired a Doctoral degree in engineering at Riga Technical University in 2015. He is currently an Associate Professor and Senior Researcher at the Institute of Heat, Gas and Water Technology, RTU. The main research areas: thermal physics, energy efficiency of buildings, HVAC systems and indoor air quality. He has been involved in projects such as: ENEF project - “Central Baltic Cooperation in Energy Efficiency & Feasibility in

Urban Planning"; FP7 project – "Strategies towards Energy Performance and Urban Planning (STEP-UP)"; HORIZON2020 project: "Development and Advanced Prefabrication of Innovative, Multifunctional Building Envelope Element for MOdular REtrofitting and CONNECTions"; ERDF project "Nearly Zero Energy Solutions for Unclassified Buildings". The expert of the Latvian Council of Science in Engineering and Technology – Construction and Transportation Engineering. J. Zemītis has more than fifteen years of practical experience in the design and energy efficiency assessment of HVAC and water supply and sewerage systems and project management. He has been certified for the design of water supply and sewer systems, including fire-fighting systems, as well as for the design of heating, ventilation, recovery and cooling systems. A member of the Association of Heat, Gas and Water Technology Engineers of Latvia since 2015. Received a REHVA award in 2017 as the best young scientist. In June 2015, the award "RTU Young Scientist of the Year" was granted by the Latvian Academy of Sciences, joint stock company "Latvijas Gāze" and RTU Development Fund. J. Zemītis is the author or co-author of more than 50 publications, 26 of which are indexed in the SCOPUS database. SCOPUS H-index is 5. He successfully completed a post-doctoral grant project. Regularly participates in various scientific and academic seminars/conferences to improve professional skills. He is a scientific adviser of graduate papers with an engineering project for the Master and Bachelor students.

Associate Professor, Dr.sc.ing. Kristīna Kokina is the Head of the Department of Water Engineering and Technology. In 2000, she obtained a Master degree in chemistry from the University of Latvia and in 2011 – a Doctoral degree in engineering at Riga Technical University. Since 2015, she has been holding the position of Associate Professor at the Institute of Heat, Gas and Water Technologies, RTU. She is also a Senior Researcher at the Water Research and Environmental Biotechnology Laboratory. Kristīna Kokina's main areas of research are water and wastewater treatment technologies. Recent projects are related to demonstrating technologies for waste water treatment: INTERREG Baltic Sea Region International Cooperation Programme BEST, # R054; WATERCHAIN, CB50; project for groundwater purification "Mobile Biofiltration Technology" by the Latvian Council of Science, as well as project COV-MITIGATE funded by the State Research Programme for Covid-19 mitigation. Kristīna Kokina is also the Head of the Laboratory of Chemistry Elemental Analysis Group at the Institute of Food Safety, Animal Health and Environment "BIOR"; technical expert in water and sewage quality and technology at the Latvian National Accreditation Bureau (LATAK), and expert of the Latvian Council of Science in Engineering, Technology –Construction and Transportation Engineering. 20 SCOPUS publications (Scopus ID 26031824500), SCOPUS h-index 4. She is a member of the Doctoral Council "RTU P-12".

Assistant Professor, Dr.sc.ing. Lana Migla obtained a Doctoral degree in engineering from Riga Technical University in 2013. She received the Annual Prize for the Young Scientist in Power Engineering from the Latvian Academy of Sciences. She has worked for 8 years at the Laboratory of Energy Resources of the Institute of Physical Energetics, where she carried out research in the field of power engineering within various international scientific projects and research contract work of public authorities. The main research areas of Lana Migla are alternative energy sources, particularly solar energy, and heating. She has been elected a Researcher at the Institute of Heat, Gas and Water Technology since 2017. A number of Bachelor and Master Theses have been developed under her guidance. In 2019, she participated in training in Greece within the ERASMUS+ programme. Lana has currently received support for post-doctoral research "Latent Heat Storage for Sustainable Operation of the Cooling System". Lana Migla is a co-author of 44 scientific publications, including 17 SCOPUS publications, SCOPUS h-index 2.

Assistant Professor, Dr.sc.ing. Jeļena Tihana obtained a Doctoral degree in engineering from Riga Technical University in 2013. At present, she holds the positions of Senior Researcher and Lecturer at the Institute of Heat, Gas and Water Technology, RTU. Jeļena Tihana is currently

implementing a post-doctoral research project “Efficiency of Gas Hybrid Equipment in the Climatic Conditions of Latvia”. She has participated in the ESF projects “Development, Optimisation and Sustainability Research of Smart Solutions for Nearly Zero Energy Buildings in Real Climate Conditions” as a Researcher and in the project “Strengthening the Academic Staff of Riga Technical University in Areas of Strategic Specialisation” as a Coordinator. Jeļena Tihana is a certified natural gas designer and implements gas systems projects. Tihana's field of research is the development of gas systems and the possibility of using gas in combination with renewable resources. 7 SCOPUS publications, SCOPUS h-index 2.

Assistant Professor, Dr.sc.ing. Aleksandrs Zajacs obtained a Doctoral degree in engineering from Riga Technical University in 2017. In the period from 2011 to 2019, A. Zajacs worked at JSC “Rīgas Siltums”, the Baltic largest district heating company. Since 2019, he has been holding the position of Senior Researcher at the Institute of Heat, Gas and Water Technology, RTU. Key research interests include evaluating scenarios for the development of district heating systems, combining renewable and fossil energy sources in the most efficient way, as well as energy efficiency issues in the district heating and housing sector. A. Zajacs is the author of more than 20 scientific articles, of which 11 published in SCOPUS database, SCOPUS h-index 4. He has gained international research experience while studying at the exchange programme of the Danish Technical University (DTU) and participating in the implementation of the EU Seventh Framework Programme, as well as Horizon 2020 projects: “Strategies towards Energy Performance and Urban Planning” (STEP-UP) and “European Research Infrastructure for Thermo-Chemical Bioomass Conversion” (BRISK) and “Nearly Zero Energy Solutions for Unclassified Buildings”. In 2018, A. Zajacs received the REHVA Young Scientists Award in academic year 2017/2018 and in 2018 - the award “Young Scientist of the Year” by JSC Latvijas Gāze and RTU Development Fund. A post-doctoral research project is currently being carried out. He is an expert of the Latvian Council of Science: Engineering and Technology – Construction and Transportation Engineering.

Assistant Professor, Dr.sc.ing. Kristīna Ļebedeva obtained a Doctoral degree in engineering from RTU in 2008. K. Ļebedeva gained great experience in the fields of renewable energy use and energy efficiency by working for 19 years at the Laboratory of Energy Resources of the Institute of Physical Energetics. K. Ļebedeva participated in many Latvian (National research programmes, Latvian Council of Science, etc.), European (ESF, EFAR, FP6 and FP7, IEE) and international (Era-Net-Lac) scientific projects as a scientific adviser, senior researcher, researcher and administrative manager. K. Ļebedeva was responsible for implementing the first significant solar energy use projects in Latvia. Working at the Laboratory of Energy Resources of the Institute of Physical Energetics, she participated in the development of testing ground for solar energy exploration. Since February 2020, she has been working at the Department of Heat Engineering and Technology of the Institute of Heat, Gas and Water Techology, the Faculty of Civil Engineering carrying out research on the practical integration of renewable energy resources into HVAC systems and energy supply systems. K. Ļebedeva actively participates in the research activities of the Faculty of Civil Engineering, RTU: draws up scientific project applications, publishes scientific papers, participates in student training (supervising and reviewing Bachelor, Master and Doctor Theses). In 2012, she received a grant by UNESCO and Peoples’ Friendship University of Russia: energy management at international level, sustainable energy development, energy services and renewables. In 2006, she was awarded the annual prize of Latvenergo and the Latvian Academy of Sciences for achievements in power engineering. She regularly reviews Doctoral Theses for the State Scientific Qualification Commission. She has participated in many international conferences, congresses and symposia. 76 scientific publications (25 SCOPUS). SCOPUS h-index 3, Google Scholar h-index - 5, 1 Latvian patent. She is an expert of the Latvian Council of Science in Engineering and Technology – Environmental Engineering and Power Engineering. Member of the Doctoral Council “RTU P-12”.

Guest Professor Primal Fernando of the Mechanical Engineering Department of the Faculty of Civil Engineering, University of Peradeniya, Sri Lanka. For more than 10 years, Primal Fernando has been delivering such courses as “Thermodynamics”, “Mechanics”, “Refrigeration Equipment” and “Power Technologies”. He obtained a Doctoral degree in the field of applied thermodynamics and refrigeration equipment engineering at the Swedish Royal Institute of Technology (KTH), while the postdoctoral position was at the State University of Florida (FSU) in the USA. Prof. Fernando was involved as a Guest Professor. He will supplement training materials within the study courses “Cooling and Refrigeration”, “Industrial Refrigeration Systems and Freezers” and “Alternative Energy for Building Heat Supply”.

Dr.sc. ing. Jānis Rubulis obtained a Doctoral degree in gas and water engineering in 2007. Since 2015, J. Rubulis has been holding the position of Associate Professor and Senior Researcher in Construction and Transporatation Engineering (heat, gas and water engineering systems) at the Department of Water Engineering and Technology. In addition to these positions, J. Rubulis is also the Head of the Institute of Water Systems and Biotechnology and a Manager of several international projects: Water Technology Innovation Roadmaps – iWatermap, Pilot Platform of Vocational Excellence Water – Pilot PoVE Water, Protecting the Baltic Sea from Untreated Wastewater Spillages during Flood Events in Urban Areas – NOAH. He has developed and has been delivering study courses “Risk Analysis of Water Resources”, “Architecture and Construction,” “Scientific Methodology for Building Systems”. Experience as an academic adviser of graduate papers in a variety of themes, such as “Reduction of Turbidity by Flushing Drinking Water Networks” and “Recovery of Phosphorous from Wastewater”. He is the author of scientific articles published in Web of Science and Scopus databases, conference proceedings and scientific journals. Co-author of the patent “Method of Anaerobic Digestation of Acidic Whey in a Four-Chamber System”.

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

6 professors – Doctors of Science, whose scientific and academic qualifications corresponds to the regulations on the criteria for the election in the professor position, are involved in the implementation of the study programme.

4 elected associate professors – Doctors of Science, whose scientific and academic qualifications corresponds to the regulations on the criteria for the election in the position of an associate professor, are involved in the implementation of the study programme. Furthermore, 10 assistant professors are involved in the implementation of the study programme.

The changes in the reporting period are significant. The changes mainly involve staff renewal. New specialists from the industry have been recruited, or an academic load has been raised for existing young specialists, who have contributed to the introduction of the latest technologies in study courses. Thus, assistant professors have joined the study programme (Aleksandrs Zajacs, Jeļena Tihana, Lana Migla). Some lecturers retired (Visvaldis Vrubļevskis, Ivars Platais) or their workload was significantly reduced (Andris Krēsliņš, Boris Gjunsburgs) and they provide only tutorials.Termination of employment due to commencing work in the construction sector that offers a significantly higher salary has occurred less frequently.

In general, changes in composition have contributed to a reduction in the average age of teaching staff. There is a tendency for the young teaching staff to become graduates of the doctoral

programme, which makes it possible to improve the educational material with the latest scientific developments that young teaching staff have studied in their promotion activities. New teaching staff are active in the areas of capacity building and mobility, which facilitates the exchange of experience and enables the content of study programmes to be improved.

The overall changes in the academic staff of the Institute of Heat, Gas and water Technology in the reporting are given in the table:

Academic position	Academic year 2016/17	Academic year 2020/21
Professor	8	5
Associate professor	8	6
Assistant professor	13	10
Lecturer	0	1
Leading researcher	2	4
Researcher	0	1
Assistant	0	1

The table shows that the programme involves new qualified members of the academic staff, thus maximally adjusting the programme curriculum to the specifics and latest development in the sector. In order to encourage staff renewal, senior and Master students are involved in the study process. Part of them continue to work in scientific projects and, with time, start to develop their academic careers.

Assistants and researchers are involved in the process of preparing practical works.

Currently, RTU is implementing SAM 8.2.2 project on "Strengthening of Academic Personnel of Riga Technical University in Strategic Specialisation Areas" financed by the European Social Fund, one of the tasks of which is the renewal of academic personnel. The aim of the project is to strengthen RTU academic personnel in the areas of strategic specialisation in 10 study fields, including the study field "Architecture and Civil Engineering". The project activities are focused on three areas:

- Involvement of Doctoral students in the work of the academic staff at RTU,
- Involvement of foreign academic staff in the work of the academic staff at RTU,
- Improvement of the existing academic staff qualifications, including academic staff internship at an economic operator.

Within the project, academic staff have an opportunity to develop their competence at the courses in professional English, as well as specialized training courses.

In order to ensure and increase the impact of scientific activities and personnel development, RTU management signs an annual agreement with each RTU faculty, which sets specific quantitative indicators in the areas of studies, scientific activities and valorisation.

3.4.3. Information on the number of the scientific publications of the academic staff members, involved in the implementation of doctoral study programme, as published

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

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

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

In the process of study programme implementation, close cooperation of academic staff takes place, which is also manifested in the following activities:

- Discussion of the results and quality of the reviews at the department meeting, discussing the evaluation criteria and ways to improve the quality of the graduate papers.
- Interconnection of lectures and practical classes, discussion of strengths and weaknesses afterwards.
- Joint attendance of methodological seminars, which are held in an interactive way, where academic staff share their experience and discuss the latest scientific and professional trends, as well as psychological and pedagogical techniques and methods for improving the study process.
- Cooperation within the projects, where the experience gained is used by the academic staff in the study process.
- Joint study tours, where academic staff and students learn about current developments in the field and apply practical case studies in classroom sessions.

The student-faculty ratio at the study programme at the time of submission of the self-evaluation report is 27/12 or one member of the academic staff to 2.25 students. Elective study courses are taken into account as well.

Annexes

III - Description of the Study Programme - 3.1. Indicators Describing the Study Programme		
Sample of the diploma and its supplement to be issued for completing the study programme	RBGSO diploms ar pielikumu.rar	RBGSO diploms ar pielikumu.rar
For academic study programmes - Opinion of the Council of Higher Education in accordance with Section 55, Paragraph two of the Law on Higher Education Institutions (if applicable)		
Compliance of the joint study programme with the provisions of the Law on Higher Education Institutions (table) (if applicable)		
Statistics on the students in the reporting period	RBGSO_5.annex ENG.docx	RBGSO_5.pielikums.docx
III - Description of the Study Programme - 3.2. The Content of Studies and Implementation Thereof		
Compliance with the study programme with the State Education Standard	6. annex RBCSO ENG.docx	6. pielikums RBCSO.docx
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard or the requirements for professional qualification (if applicable)		
Compliance of the study programme with the specific regulatory framework applicable to the relevant field (if applicable)		
Mapping of the study courses/ modules for the achievement of the learning outcomes of the study programme	RBGSO 8. annexENG.xlsx	RBGSO 8. pielikums.xlsx
The curriculum of the study programme (for each type and form of the implementation of the study programme)	annex 9 RBGSO ENG.rar	9. pielikums RBGSO.rar
Descriptions of the study courses/ modules	RBGSO ENG.rar	RBGSO LV.rar
Description of the organisation of the internship of the students (if applicable)	Internship_Management_Procedure.pdf	Prakses_organizesanas_kartiba.pdf
III - Description of the Study Programme - 3.4. Teaching Staff		
Confirmation that the academic staff of the doctoral study programme includes not less than five doctors, of which at least three are experts approved by the Latvian Council of Science in the branch or sub-branch of science in which the study programme intends to award a scientific degree (if applicable)		
Confirmation that the academic staff of the academic study programme complies with the requirements specified in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions (if applicable)		

Civil Engineering (41582)

Study field	*Architecture and Construction*
ProcedureStudyProgram.Name	*Civil Engineering*
Education classification code	*41582*
Type of the study programme	*First level professional higher education study programme*
Name of the study programme director	*Baiba*
Surname of the study programme director	*Gaujēna*
E-mail of the study programme director	*baiba.gaujena@rtu.lv*
Title of the study programme director	*Asoc. profesore/ Dr.sc.ing.*
Phone of the study programme director	
Goal of the study programme	*The aim of the study program is to prepare 4th level professional qualification Supervisors of Building construction works and Supervisors of Road construction works corresponding to the requirements of the labor market, who can perform complex contractor work, as well as organize and manage construction works in accordance with legislation.*
Tasks of the study programme	*The first level professional higher education study program envisages in-depth acquisition of fundamental sciences, technical and economic courses corresponding to the chosen field, as well as humanitarian and social courses in lectures, practical classes, practical placement and studies of permanent literature.*
Results of the study programme	*Graduates of the study programme:* *- is able to demonstrate comprehensive knowledge of facts, theories and regularities necessary for personal growth and development, civic participation, social integration and further education;* *- is able to understand in detail and demonstrate a variety of specific facts, principles, processes and concepts in a particular field of study or professional activity in standard and non-standard situations;* *- knows technologies and methods for performing study tasks or work tasks;* *- is able to plan and organize work, use various methods, technologies (including information and communication technologies), devices, tools and materials for tasks;* *- is able to find, evaluate and creatively use information for the performance of study or professional work tasks and problem solving;* *- is able to work independently in the profession, study and improve;* *- are motivated for future careers, further education, lifelong learning in a knowledge-based democratic, multilingual and multicultural society in Europe and the world;* *- is able to cooperate, plan and perform study or work tasks in the profession individually, in a team or leading a team work;* *- is able to take responsibility for the quality and quantity of learning or professional outcomes.*

Final examination upon the completion of the study programme	*Qualification work dedicated to current problems in the field according to the chosen direction.*

Study programme forms

Full time studies - 3 years - latvian

Study type and form	*Full time studies*
Duration in full years	*3*
Duration in month	*0*
Language	*latvian*
Amount (CP)	*120*
Admission requirements (in English)	*general or vocational secondary education*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*-*
Qualification to be obtained (in english)	*Supervisor of Road Construction Works*

Places of implementation

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

Full time studies - 3 years - latvian

Study type and form	*Full time studies*
Duration in full years	*3*
Duration in month	*0*
Language	*latvian*
Amount (CP)	*120*
Admission requirements (in English)	*general or vocational secondary education*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*-*
Qualification to be obtained (in english)	*Supervisor of Building Construction Works*

Places of implementation

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

Part time extramural studies - 3 years, 6 months - latvian

Study type and form	*Part time extramural studies*
Duration in full years	*3*
Duration in month	*6*
Language	*latvian*
Amount (CP)	*120*
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)	*-*

Qualification to be obtained (in english)	*Supervisor of Road Construction Works*

Places of implementation

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

Part time extramural studies - 3 years, 6 months - latvian

Study type and form	*Part time extramural studies*
Duration in full years	*3*
Duration in month	*6*
Language	*latvian*
Amount (CP)	*120*
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)	-
Qualification to be obtained (in english)	*Supervisor of Building Construction Works*

Places of implementation

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

3.1. Indicators Describing the Study Programme

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

The first level Professional College Study Programme "Civil Engineering", education classification code 41582, was approved at the Meeting of RTU Senate on 26 June 2000, Minutes No 451; MES license 04051-142 issued on 16 April 2009; accredited by decision of MES Accreditation Committee of 29 May 2017.

In the reporting period from 2017 to 2021, no changed to the study programme parameters have been made. But the programme has been supplemented with courses that provide the programme with two specialisation areas – Supervisor of Building Construction works and Supervisor of Road Constructions works. See Annex 9 for the study courses which provide both areas of qualification. The first level professional (college) study programme “Civil Engineering” envisages full-time studies of 3 years and part-time (extramural) studies of 3 years and 6 months. Upon completion of the study programme and public presentation of the qualification paper, the student obtains the Qualification of Supervisor of Building Construction works and Supervisor of Road Constructions works.

During the reporting period, the title of the qualification awarded in The first level Professional College Study Programme "Civil Engineering" was changed due to the changes in the Cabinet of Ministers Regulations of 5 April 2016, which entered into force on 1 January 2017 with regard to the Latvian Qualifications Framework. Previously, the title of Construction Organiser in Transport Construction has been changed to Qualification of Supervisor of Road Construction Works, after which the title of the qualification in the study programme has also been changed. In order to make the programme more attractive to students and more relevant to the industry, it has been supplemented with another study stream - Qualification of Supervisor of Building Construction Works. The aim of combining these two streams is to provide the industry with knowledgeable and quality construction supervisors with the appropriate skills, knowledge and competences for the specific stream.

The content and curriculum of the first level professional (college) study programme "Civil Engineering" as well as its aims are in line with the mission statement of RTU: to provide internationally competitive high-quality scientific research, higher education, technology transfer and innovation to the Latvian economy and society.

Currently, this is the only study programme that educates and trains supervisor of road construction works in Latvia. The study programme is implemented in Latvian; the place of implementation is Riga.

3.1.2. Analysis and assessment of the study programme compliance with the study field. Analysis of the interrelation between the code of the study programme, the degree, professional qualification/professional qualification requirements or the degree and

professional qualification to be acquired, the aims, objectives, learning outcomes, and the admission requirements. Description of the duration and scope of the implementation of the study programme (including different options of the study programme implementation) and evaluation of its usefulness.

The first level Professional College Study Programme "Civil Engineering" has been developed considering the current trends in higher professional education in Europe; it has been designed to be recognizable in Europe, to make sure students acquire both theoretical knowledge and practical skills to be competitive in the European labour market.

The aim of the study programme is to provide education and training to supervising civil engineers meeting the requirements of Level 4 of the professional qualification, who can perform complex contractor work, as well as organise and manage construction works in accordance with legislation.

The quality of learning outcomes to be achieved in the course of studies is ensured by the coordinated system of program prerequisites, study aims and tasks. The general principles of the system are defined by RTU Regulations of Studies www.rtu.lv/content/view/5257/1874/lang,lv/ (In Latvian).

The implementation of the programme complies with the Education Development Guidelines 2021 - 2027 “Future Skills for the Future Society” (IZMpamn_210621_VVPP2027.405.docx (live.com) (In Latvian)) and in the course of its implementation supervising civil engineers are educated and trained. The improvement of the college study programme follows the requirements of the European Qualifications Framework, which complies with the Bologna process and other regulatory enactments.

Applicants with general or vocational secondary education are admitted to the programme.

Enrolment procedure to the Bachelor studies is regulated by “Regulation on enrolment to undergraduate academic and professional study programmes” approved by RTU Senate (https://www.rtu.lv/lv/studijas/uznemsana/uznemsanas-noteikumi/uznemsanas-noteikumi-pamatstudijas (In Latvian)).

The aim of the study programme is to provide education and training to supervising civil engineers meeting the requirements of Level 4 of the professional qualification, who can perform complex contractor work, as well as organise and manage construction works in accordance with legislation.

In order to reach the aim, the following tasks of the study programme have been defined:

- to ensure competitive college education in the field of civil engineering meeting quality requirements stipulated by the international standards;
- to provide the students comprehensive knowledge, develop skills and competences in accordance with the requirements of the labour market, to prepare students for practical work;
- to ensure development and improvement of the study program curriculum, study process, research activities accounting for the changes in international practice and research in the field of road transport infrastructure;
- to promote students’ interest in further professional advancement, development of their academic knowledge and motivate them to continue studies at the Bachelor and Master level programs;
- to develop students’ research skills and facilitate their practical application;
- to raise students’ interest in the current social processes, stimulate students’ personal

development to become positive, modern, responsible, ethical and active person who may independently act and make decisions;
- to promote research activities by academic personnel and students and support practical implementation of the research results, to promote their international mobility and participation in the projects.

As a result of mastering the study programme, a graduate will be able (planned learning outcomes):

- is able to demonstrate comprehensive knowledge of facts, theories and regularities necessary for personal growth and development, civic participation, social integration and further education;
- is able to understand in detail and demonstrate a variety of specific facts, principles, processes and concepts in a particular field of study or professional activity in standard and non-standard situations;
- knows technologies and methods for performing study tasks or work tasks;
- is able to plan and organize work, use various methods, technologies (including information and communication technologies), devices, tools and materials for tasks;
- is able to find, evaluate and creatively use information for the performance of study or professional work tasks and problem solving;
- is able to work independently in the profession, study and improve;
- are motivated for future careers, further education, lifelong learning in a knowledge-based democratic, multilingual and multicultural society in Europe and the world;
- is able to cooperate, plan and perform study or work tasks in the profession individually, in a team or leading a team work;
- is able to take responsibility for the quality and quantity of learning or professional outcomes.

The aims, tasks and learning outcomes of the 1st level Professional College Study Programme "Civil Engineering" are interlinked and their reachability is very high.

The study programme is professional; thus, it always offers learning field trips and exchange of practical information at the enterprises and practical classes to improve skills and competences of students according to the set learning outcomes of the study programme.

The study programme promotes implementation of the leitmotif of Riga Technical University (RTU) as defined in its 2021 - 2025 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 educated and trains European and global-level engineers – leaders: developers of new technologies*." (Strategy | Riga Technical University (rtu.lv)).

The study programme fully complies with the development aim of RTU Faculty of Civil Engineering – to become an internationally recognized leading Latvian educational, research and development institution in the field of civil engineering, providing high quality study process, internationally recognized research and sustainable innovation, commercialization and knowledge transfer for economic development.

The duration of the study program is 3 years in full-time studies or 3 years and 6 months in part-time studies. Its amount is 120 CP, which includes compulsory study courses, compulsory elective study courses, elective study courses, also practical placement and state examination, which include Qualifications work. It is possible to study the study program full-time and part-time, which is highly valued and used by employees already working in the construction industry, who also have

the opportunity to obtain higher education in parallel with work in the industry.

After 3 years or 3 years and 6 months in the first level Professional College Study Programme, the student obtains the qualification of Supervisor of Building Construction Works or Supervisor of Road Construction Works, which corresponds to the professional standard PS-161 and PS-162 (https://registri.visc.gov.lv/profizglitiba/dokumenti/standarti/2017/PS-161.pdf; https://registri.visc.gov.lv/profizglitiba/dokumenti/standarti/2017/PS-162.pdf (In Latvian)), approved in 2021.

Programme code 41582 complies with Cabinet of Ministers Regulation No 322 Latvian Classification of Education. The first and second levels of classification, represented by the first two digits of code 41, are 1st level professional higher education (vocational qualification at level 4), following general or vocational secondary education. The third, fourth and fifth levels of classification (thematic groups, subject areas and programme groups), denoted by the next three digits 582, are Civil Engineering (58 stands for Architecture and Civil Engineering).

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

Highly qualified professionals, namely of the professions subject to the national regulation are trained in the majority of **The first level Professional College Study Programme "Civil Engineering"**.

Professionals educated within the scope of the study program involve in processes aimed at improving, maintaining and transforming the quality of the living space of the society, and implementation of the study program comprised therein is based on complex knowledge and understanding of the interaction of technical, social and economic factors in creating sustainable environment. These principles conform to the long-term interests of the Republic of Latvia and RTU strategy guidelines.

The study program comprised by it conform with the strategic development directions of the university, the needs of the public and the national economy and development trends. All the programs include the requirements of the Latvian and the European Union legislation.

The economic and social substantiation of the study program is based on performed industry surveys, which are regularly performed on annual basis by the Ministry of Economics, and it is aimed at following up the development trends of the civil engineering field, including fluctuations in the increase of the construction and the indices of increase of the construction costs, in order to identify factors hindering development of the industry and eventual overheating risks in a timely manner, as well as forecasting the production scope and costs in the next years by applying forecasting methods. The survey reveals that during the whole period from 2020 to 2024 the experts and combined forecasts predict further increase of the industry costs. During the period from 2020 to 2022 this increase could be estimated within a range of 1% to 5% per year, and in 2024 it could achieve 6%. According to the forecast the biggest increase of costs relates to labour costs where the combined forecast predicts a general increase of 8% to 10% per year over the period from 2020 to 2024. As regards sub-fields, in 2020 a decrease of the industry costs is predicted in the construction of residential and non-residential buildings, as well as in the construction of roads and highways. The most rapid increase is predicted in the construction of bridges and tunnels. An increase of costs in all the sub-fields is forecasted as from 2022 by the

construction of bridges and tunnels leading with an annual increase of 5-7%.

The industry researchers have concluded that also defects and deficiencies in construction design documents and insufficient scope of preliminary studies present risks of increase of prices on the level of individual sites in the industry of architecture and civil engineering. In order to mitigate this risk, it is important to implement the building information modelling (BIM) system in Latvia as soon as possible, as it can considerably improve the quality of construction design documents, contribute to predictability of construction, optimise organisation of construction works and their sequential performance, reduce construction terms and improve efficiency of project management and supervision.

The civil engineering industry has experienced very fast development as from 2017. Its growth amounted to 19.4% in 2017 and to 21.9% in 2018; construction volumes increased in all the core groups of construction during the last year. Both availability of the EU funding and private investment encourage the industry growth. Attraction of employees in the industry has restarted since 2018, the number of employees was 74.6 thousand last year accounting for 30% increase compared to 2010, however, the pace of the growth was lagging behind that of the production growth. The wages of employees have increased considerably in the industry during the last two years and last year they amounted to 94.6% of the mean wage in the national economy.

When analysing the employment of graduates, it should be noted that they are mainly employed in private companies, municipal development departments and construction boards, design companies, public administrations and other sector-related organisations. These include "Skonto Būve" Ltd, "Merks" Ltd, "UPB" JSC, international companies such as Hilti, Peri, Knauf, Riga Construction Board and other construction boards, Transportation Administration, JSC "Ceļu projekts", Rail Baltica. Many students find a job during their internship, and around 90% continue to work in their internship after graduation.

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

The number of students at the programme during the reporting period from 2017 till 2021 have been with downward sliding curve. Comparing academic year 2016/2017 and 2020/20121 is large difference in part-time students – approximately 55% but it is not so large for full-time students – approximately 25%.

The fluctuations in the number of students are due to the following:

- Decrease of the overall number of school graduates;
- Uncertainty with the development rate and direction of the construction industry.

For detailed information about distribution of students see Chart 1 in Annex 5.

During the reporting period the difference between enrolled students are been unstable, in some years it has been with upward trend, but in other years have fallen. In Part-time studies it has been downward sliding curve, but this can be explained by the fact that students still prefer full-time studies, because the study plan is very flexible and accommodating to the needs of students. For enrolment of students see Chart 2 in Annex 5.

In academic year 2019/2020, 19 alumni were awarded with qualification of Transportation Manager (see Chart 3 in Annex 5). Compared to other academic years, the number of alumni did not change, which can be estimated as a positive indicator.

The costs of professional college studies are covered by the state budget. Latvian is the main language of instruction at the professional college study programme; however, when high-level professors are invited, (for example, prof. Gintaris Kaklauskas from VGTU, prof. Darius Bačinskas from VGTU) the lectures are conducted in English.

The data over the reporting period allow concluding that the drop-out rate among students at the college study programme is not high. On average, it does not surpass 15% -25% of the overall number (see Chart 4 and 5 in Annex 5).

The main reasons for dropping out are the following:

- academic failure (55% of cases);
- personal decision (15% of cases);
- discontinued studies after the academic leave (30% of cases);
- other reasons.

Despite the aforementioned reasons, the sector of civil and transportation engineering is rapidly developing (billion-euro worth project RailBaltic has started), which allows forecasting that the study programme can expect a steady student enrolment.

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

3.2. The Content of Studies and Implementation Thereof

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

The content of **the first level Professional College Study Programme "Civil Engineering"** complies with the regulatory enactments of the Republic of Latvia, RTU internal regulations, Development Strategy of RTU and that of the Faculty of Civil Engineering, as well as contributes to the achievement of the United Nations Sustainable Development Goals (SDGs).

The first level professional college study programme “Civil Engineering” envisages the acquisition of general education courses, professional specialization courses, humanities and social science courses as well as second foreign language courses in the relevant specialty area. As the study program also incorporates internship and development of a qualification paper, having completed the Program the graduate has fulfilled requirements of Occupational Standard of Supervising Civil Engineer and can be considered a fully-fledged professional with the 4th qualification level.

A supervising civil engineer is a construction professional who has acquired relevant professional education in construction and relevant practical experience in construction management, plans the implementation of specific construction projects based on the project documentation, the terms of the contract for project implementation and his/her experience, identifies and proposes contractors for specific types and volumes of construction work, assembles teams of construction workers to carry out specific volumes of work, selects construction machinery and equipment to carry out these works, selects construction materials and construction structures appropriate to the project and plans their delivery to the construction site, plans the cooperation of all participants involved in the execution of the construction project and the procedure for carrying out the construction work, gives the necessary orders to subordinates and participants in the execution of the construction project and checks the execution of these orders, ensures that the construction work is carried out in accordance with the requirements of the construction project, construction regulations and standards and that its cost is within the approved construction costs; takes the necessary measures for quality assurance and occupational safety on the construction site; draws up the executive documentation for the construction as required by the building regulations; draws up and submits the necessary reports to the management.

Within the study programme, themes of theoretical papers and practical tasks are regularly related to current trends in the industry. Research and creative work results are regularly reflected in scientific journals and conference materials. The Faculty of Civil Engineering regularly publishes the Baltic Journal of Road and Bridge Engineering https://bjrbe-journals.rtu.lv/, which is included in the SCOPUS and WEB of Science databases. Every year, the academic staff of the Faculty of Civil Engineering publishes dozens of articles in various local and international scientific journals and presents more than 20 papers at local and international scientific conferences. The variety in topics showcases a broad range of interests among staff members, which ensures informativeness and a creative diversity in the study process.

The first level professional college study programme “Civil Engineering” envisages the study period of 3 years for full-time studies and 3.5 years for part-time (extramural) studies with the total volume of 120 CP. The information included in the study courses comes from the aims of the study courses and the learning outcomes, which in turn follow from the aim of the programme and the learning outcomes. The link is clearly visible from the mapping of the study programme (see Annex 8).

All study courses in the programme are divided into 6 blocks:

Part A (43CP) – Compulsory study courses divided into sub-sections – basic study courses, basic profession-oriented theoretical courses and IT study courses, as well as professional specialization study courses.

Part B (50 CP) – Compulsory elective study courses divided into sub-sections – professional specialization study courses, study courses in humanities and social sciences, and languages.

Part D (16 CP) – Internship.

Part E (11 CP) – Final / state examinations, which include a Qualification Paper.

Each study course has a defined aim and learning outcomes to be achieved. All knowledge, skills and competences in the study course are related and subordinated to the aims and expected learning outcomes of the study programme. The plan of the study programme is given in Annex 9; the descriptions of the study courses – in Annex 10. Each study course provides acquisition of 1 through 5 programme outcomes. Each programme outcome corresponds to at least 1 study course, but on average these are 5 or more courses.

Prior to the start of an academic term, each member of the academic staff has to examine the course description, assessing the existing aims of the course and the expected learning outcomes, and has to examine the learning materials and literature, make sure that the literature is up-to-date and includes the advanced research in the field. Analysis of compliance of the curriculum of the study programme "Civil Engineering" to the state standards allows concluding that the programme complies fully to the requirements. For compliance of the study programme to the state education standard see Annex 6 and for compliance of the study programme to the professional standard see Annex 7. To provide the cross- complementarity of the study courses, as well as to avoid duplication, the academic staff discusses regularly the structure of the study programme. The descriptions of the study courses are available on ORTUS platform, so the academic staff has access to descriptions of other study courses which ensures their interconnection.

The reconstruction of the building of the Faculty of Civil Engineering Period has been done from 2019 until 2021, which resulted in a modern building and new laboratory premises.

The first level Professional College Study Programme "Civil Engineering" has been developed in line with the trends of higher professional education in Europe and is designed to be recognisable in Europe so that students acquire both theoretical knowledge and practical skills and are competitive in the European labour market.

For example, in study direction Transportation, the aim of the EU transport policy is to ensure high mobility for people and enterprises in the Europe Union, including Latvia. This means accessible and high-quality transport and transportation infrastructure solutions, free movement of people, goods, and services, improvement of social and economic unity, as well as assurance of the competitiveness of the European economy. Transport flows in Europe are dominated by road transport. It serves all Europeans (even those who do not travel, for the food and other goods are delivered via road transport). Road transport accounts for 83% of passenger transport in the EU and 46% of all freight transport. Society's biggest and most long-term investments are aimed at the construction of transport infrastructure; therefore, high qualification specialists are necessary, who can design roads, bridges, other transport structures, manage construction projects, maintain these structures in working order, conduct scientific research, and develop new theories and methods of civil engineering.

Education in the field of civil and transportation engineering at Riga Technical University (RTU) is implemented by the Faculty of Civil Engineering (FCE). It is implemented at the state accredited study programs at the four consecutive levels of academic education and professional qualification development. The first and second levels (college program and professional Bachelor studies) provide education necessary to perform professional activities in the field, the third and fourth levels (Master and Doctoral) – to perform research and pedagogical activities. Each education level provides education, which corresponds to the respective employment opportunities in accordance with the requirements of the State Professional Standard.

The first level professional college study program "Civil Engineering" consists of a set of lectures, practical classes and independent literature studies. Students obtain in depth knowledge within technical and economic study courses relevant for the field of civil and transportation engineering, as well as courses in humanities and social sciences.

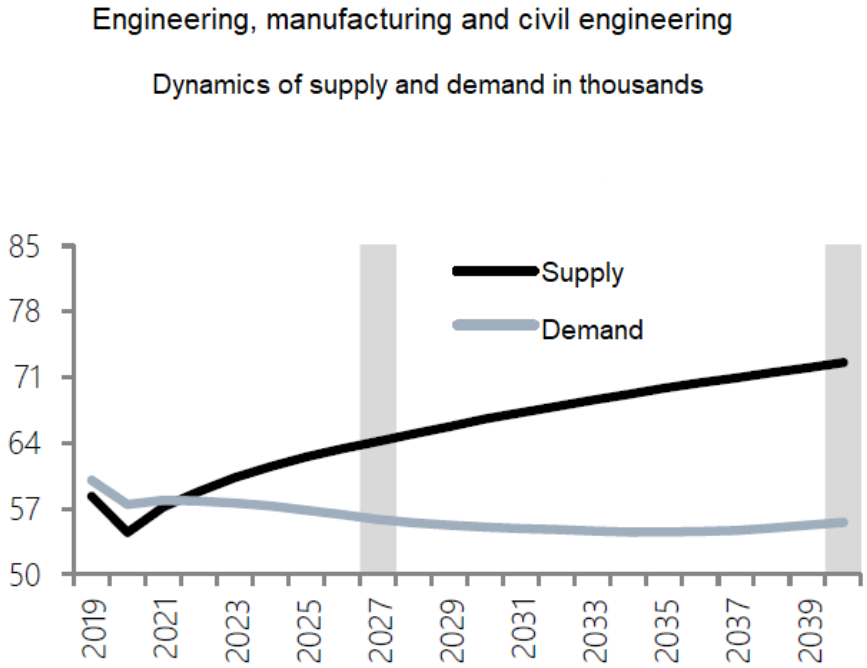
In the process of its improvement, the recent changes in both civil and transportation engineering in Latvia and in Europe have been studied. The main emphasis has been placed on the introduction of new technologies to the study process, as well the training of the students to use construction information modelling which is included now in the study courses. The EU Building information modelling (BIM) representatives stress that BIM is a new opportunity of a digital age to increase quality and productivity in construction; therefore, introduction of BIM is vital to the study programme. Using BIM approach makes construction more reliable and productive, for it allows a more effective use of resources – both human and financial resources. Many study courses are interconnected and the learning outcomes of one course refer to the tasks of the next course. They are interconnected through the principle of construction information modelling. For example, the learning outcomes of the course BKO307 "Project I1" (study project 1 – sketch design of a bridge) are directly related to the tasks of the course BKO307 Project I2 (study project 2 – technical design of a bridge) or, for example, the skills acquired in the course BTG711 "Building Information Modelling" are directly required for the study course BRC202 "Basic Course of Architecture" and in turn the learning outcomes of this study course are used to acquire the study course BBR745 "Construction Technology".

The study programme is being improved to make it appealing for young professionals. Research and analysis are carried out considering other universities across different European regions in order to improve the study programme as comprehensively as possible. The study courses within the study programme are based on general trends in construction and transportation engineering industry – they are included in the study courses, also the general professional understanding of the study courses needed to be mastered by the professionals in the field is also covered. The study programme is modern and follows the latest trends outside Latvia, as well as it is specific enough in Latvia to claim that it has its own well-defined place in the family of other study programmes in the field of engineering sciences.

The academic staff of the programme regularly follow and update the study courses so that they are based on the achievements and acknowledgements of the respective field of science. Course descriptions will be approved by the Programme Director and the Head of Department prior to the start of each semester to keep abreast of academic staff workload and possible development. The teaching staff also update the content of study courses in accordance with the trends of scientific development, using information available in the databases of scientific articles - EBSCO, Emerald, Scopus, Web of Science, etc. Academic personnel are motivated to publish the results of their research, especially in the scientific databases SCOPUS and Web of Science, with a royalty for each article published in these databases. The results of the academic staff development are evaluated each year during the annual appraisal and the results are used to plan further professional advancement of each member of the academic staff.

The Informative Report on Medium and Long-term Labour Market Forecasts for 2020 of the Ministry of Economics indicates that in 2030 the demand for labour will exceed the level of 2019 by 4.7% and will make up one fifth of the total number of employees in the economy. This in turn will boost the employers' interest in recruiting new employees with knowledge in digital technologies, computer science, as well as people with analytical thinking skills. It is forecasted that the demand for workforce will grow in only three sectors – commercial services, **civil engineering** and manufacturing, see Figure 3.2.1.

Figure 3.2.1.



This repeatedly attests that RTU educated and trained specialists with higher education will be in high demand in the labour market.

The study programme is also improved after evaluation of the final examinations, as representatives of employers regularly take part in the work of Graduate Paper Examination Committees to assess the knowledge acquired by students within the study programme. Participating in the work of the Graduate Paper Examination Committees representatives from the industry can express their suggestions concerning the desired topics for student research in demand in the labour market. These recommendations are taken into account while improving the courses of the study programme for the next academic year.

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

Not relevant!

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

The first level Professional College Study Programme “Civil Engineering” has been developed so as to ensure successive development of knowledge, competences and skills on the basis of individual and group work, as well as continuous communication between the student and the instructor.

The study courses are evaluated in accordance with the RTU Senate Decision of 29 March 2010 "On the Regulations for Evaluation of Learning Outcomes", the RTU Senate Decision of 25 May 2001 "On the Criteria for Evaluation of Learning Outcomes " and the RTU Senate Decision of 29 January 2001 "On the Transition to a Unified Evaluation of Study Results" in a 10-point system (10 - excellent, 1 - very, very poor). The examinations consist of tests, study papers and exams according to the study plans approved for each semester.

Learning outcomes for each study course are defined separately, they are included in the Study Course Description that is published in the RTU Study Course Catalogue. Each instructor within their study course tests the knowledge, skills and competences of the students specified in the course description (papers, tests, presentations, independent works, case study analyses, group works, etc.). The final grade is the sum of all test papers and examination grades, the percentages of which are also indicated in each course description and presented to students at the beginning of the semester.

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 in ORTUS portal 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 program and learning outcomes are taken into consideration.

Student-cantered teaching and learning principles are observed within the professional college study programme. The approaches used during studies promote achievement of the aims and learning outcomes of the study courses and programme. Students have an opportunity to influence their study process, remain autonomous, submit feedback on the study process, aligning it with their expectations. It must be noted that learning and training guidelines are defined in the RTU Code of Academic Integrity, Regulation on the Assessment of Learning Outcomes, the methodological guidelines for development of the study papers and the thesis, etc.

The college study programme with a large share of individual work, which respects the differences among the students taking into account academic background and experience of each student, as well as research activities, very well meets the principles of student-centred learning. It allows concluding that the courses within the study programme are student-centred. Implementation of the study programme is carried out using different modes of the study course implementation. Students work in small groups, but at senior courses - through individual work, which allows applying appropriate and diversified pedagogical approaches. The study process is organized in the way to encourage the autonomy of students, simultaneously providing support to the member of the academic staff in their capacity of scientific supervisor a mentor.

Successful performance of the internal education quality assurance system at RTU is ensured at the

following levels:

At the **level of the Office of Vice-Rector for Academic Affairs**, internal education quality assurance is performed by the Study Department, which:

- provides operations and control of RTU Study Course (SC) Register, monitoring whether the study course correspond to the requirements of the respective tertiary education program and its content;
- surveys students at the university level to discover how successfully first year students have adapted to the university system, to find out the level of student satisfaction with the study process, lectures, practical classes and academic staff, as well as ensures that survey results are available to RTU Study Department, each member of academic staff, heads of departments, Deputy Dean for Studies and a responsible person at the Office of Vice-Rector for Academic Affairs;
- ensures relevant premises and technical support to general lectures (100 – 200 seats).

At the **level of RTU faculties**:

- once a year, the head of the study programme submits a report to the Council of the faculty, prior to that assessing and ensuring the relevance of the study program at the Faculty Study Field Commission;
- student self-government is involved in the overall quality assurance process of the study program. Representatives of the student self-government actively participate in work of decision-making bodies: RTU Academic Assembly, RTU Senate, RTU Senate Commissions and Faculty Council.

At the **department level**:

- each semester the administration of the study programme analyses the results of the student survey on the quality of academic staff performance and overall assessment of the study program. The results are discussed at the department meetings, meetings of the Faculty Study Field Commission and Faculty Council meetings;
- once per academic year annotations to the study course within the study program, course syllabi, methodological resources, the list of literature and the guidelines for development of the course works (reports, papers, internship reports and graduate papers) are reviewed;
- courses and seminars for faculty members are regularly organized to address such issues as the newest teaching and pedagogical methods. Members of academic personnel are motivated to attend qualification advancement courses;
- academic personnel and administration of the study program participate in various experience exchange activities, cooperating with universities from other countries, meeting representatives of the industry and entrepreneurs, discussing topical industry issues and student research work and projects;
- departments continuously monitor that the quality of the premises and equipment meets quality requirements and update the resources as necessary.

Additional quality assurance system accounting for the specifics of the study field is implemented **within the study programme**:

- regular monitoring of student individual performance (responsible authority – academic staff);
- regular reporting of performance results in the RTU Study Management System (responsible authority – faculty record management department);

- regular monitoring of the study program implementation process (responsible authority – program administration);
- regular discussion with the student self-government and program administration on the detected drawbacks and risks related to the study process (responsible authority – student self-government);
- regular updating individual courses and themes accounting for the newest discoveries and trends in the research field (responsible authority – Faculty Study Program Council);
- arbitration mechanism (responsible authority – program administration).

Examination and credit test questions are prepared by the instructor responsible for the study course based on the approved description of the study course and the study program. Examination questions are formulated to ensure that a student is capable to comprehensively answer them thus demonstrating that they have fully covered course content. Tests are carried out in accordance with the requirements stipulated in effective RTU regulations.

Examinations set by the program allow making sound conclusions about the level of knowledge and skills of each student assessing their progress in the long term. In order to improve student academic performance and raise their interest in acquiring comprehensive knowledge, FIC runs an annual competition among the students for the opportunity to continue studies on the state budget funds. The only criterion that is taken into consideration is student’s academic performance in the previous period.

Pedagogical methods, ways of teaching, learning and assessment are regularly evaluated. Topical issues are discussed at departmental meetings, at the meetings of the Methodological Council. At the end of the course, students evaluate the performance of each member of academic staff by completing a course evaluation questionnaire. Students have the possibility to apply for personal tutorials, which are organised either systematically every week or by appointment at fixed times. Some courses also use methods where students can self-assess and engage in group work to facilitate learning.

Assessment of student advancement and their performance is conducted through the entire period of program implementation. At the seminar’s students submit their works to the instructor and develop their presentation skills and competences. Tests envisioned by the program allow making sound conclusions about the level of knowledge and skills of each student assessing their progress in the long term. Presentations of course papers are public and are aimed at developing students’ discussion skills.

Riga Technical University regularly analyses the questionnaires that each student completes at the end of the semester for each course. The students also organise meetings with the programme director to discuss the positive and negative features of the semester courses, as well as the competence, abilities, attitude and quality of each member of academic staff. In this way, students have the opportunity to influence the study process and contribute to its improvement.

Academic staff take into account and respect student diversity and their needs, using different ways of delivering the programme according to students' capabilities. Studies rely on the student's autonomy, while at the same time providing guidance and support from the instructor - the description of each study course specifies the scope and content of students' independent work, as well as the methods of its assessment.

The organisation of the study process differs between the two study options. Full-time studies take place mostly on weekdays, while part-time studies take place on weekday evenings or weekends. The difference in contact hours can be seen in the course descriptions and in the timetable, where the total duration of study is 6 months longer than in full-time studies. The outcomes to be

achieved are the same for both options, the information to be learned is also the same, but only the implementation option and the timing are different.

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

The **first level professional college study programme "Civil Engineering"** includes Internship in the volume of 16 CP.

Internship is an integral part of a professional study programme, which is to be done according to LR regulations, the resolution of RTU Senate of 29 April, 2002 "On the structure of the second-level professional study programmes" and the resolution of RTU Senate of 28 January, 2019 "On organization of internship at Riga Technical University, new edition".

The aim of the internship is to participate in the work of an organisation, get acquainted with company's technical and technological equipment, compile technical specifications and informative material, complete practical tasks, which could require the use of the previously acquired knowledge.

A place for internship can be any company or organization, which allows acquiring the basics of civil and transportation engineer job related to construction project design, management, technology of construction materials, management of civil works, planning and supervision of civil works, project documentation, procedure of on-site works, experience in working with construction regulations and standards, planning of necessary activities for on-site quality control and labour safety, preparation and control of as-built documentation, supervision and analysis of the works, effective and appropriate use of resources, competence in issues of building operations, use of design software.

If students need it, RTU offers assistance of a student career specialist, who can find a suitable place of internship, but a student also can choose the place of internship individually, which is also the most popular way of finding a place for internship at the study programme. After that a tripartite cooperation agreement is concluded and the student can proceed to complete the internship tasks within 16 weeks. The agreement mentions contact persons – an internship supervisor at the company and an internship supervisor at the University. The internship supervisor at the University is the Head of the study programme or another person according to the study plan. The internship supervisor at the University provides support during the internship period. After the internship period, the student submits the internship report. Before the submission of the internship report, the internship supervisor reviews the report, gives feedback, and comments regarding the improvement of the report, which enable the student to better prepare for the public presentation. After that, in the presence of the internship supervisor, the student publicly presents the internship results to the group of fellow students. Internship is evaluated according to a 10-point grading scale.

Professional internship influences the overall learning outcomes, for it is one of the final stages

before the elaboration of the Qualification Paper and the engineering project; therefore, during the internship the student must demonstrate the knowledge defined in the study programme, apply the skills and acquired competences. The internship shows student performance to a greater extent than individual study courses.

The internship tasks included in the study programme are individual and are closely related to the analysis and assessment of the learning outcomes of the study programme. Within the study programme, internship mentors and supervisors support the students in the achievement of the set tasks by means of regular communication and internship supervision.

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/lv/studentuserviss/karjeras-centrs-ssc/karjeras-diena (in Latvian). In 2021, due to the pandemic, the event happened in a virtual setting.

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 provision of internship places to students.

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

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

The first level professional college study programme “Civil Engineering” includes a final examination – a Qualification Work in the volume of 11 CP.

The final examination is a project for the execution of works in the field of construction of buildings and roads or bridges.

At the final examination, a student should demonstrate their professional and research skills according to the professional standard, as well as to demonstrate ability to design buildings and roads or bridges, conduct construction calculations, use modern construction materials and technology, develop construction process planning and supervision projects, draw up a paper according to the requirements for qualifications papers, present it in public in front of the committee and defend the solutions stated in the project.

The final examination procedure implies development of a Qualification Work. The topic of the Qualification Paper shall be approved by a scientific adviser and the head of the department. Students choose the fields of their Qualification Papers from the sample topics suggested by each department; or, more often, they solve problems relevant to the industry or company according to the latest internship. The academic staff member of the department or an engineer in civil or transportation engineering holding a Bachelor or Master degree can be a scientific adviser of the Qualification Work.

A student and their scientific adviser also agree upon the calendar plan, but each department has its own control terms, taking into account that both autumn and the spring academic terms consist of 16 academic weeks. The theme of the Qualification Paper and engineering project is chosen during the 5th semester, In the last, the 6th semester after 16 weeks the Qualification Paper must be submitted to the State Examination Committee for public presentation. Student must receive scientific adviser’s approval for the viva voce examination. In case the student has not completed all the requirements imposed by the scientific adviser, or in case of excessive plagiarism (> 30%), the viva voce examination is not allowed.

Before the Viva Voce, the paper is reviewed by reviewers approved by the order of the head of the Department of Roads and Bridges. The Viva Voce Examination is public, it is evaluated by the State Final Examination Committee approved by RTU Rector, which includes representatives of professional civil and transportation engineering associations and companies.

Examples of the themes of recent Qualification Papers:

- Reconstruction of a Section of the P72 Highway.
- Efficiency of Compact Asphalt Paving Technology.
- Reconstruction of a Section of Daugavpils Street in Preiļi.
- Riga Street Reconstruction Project in Limbaži.
- Work Execution Project for Reconstruction of the Section of Tukums-Auce-Lithuanian Border Highway (km 55.68-60.80).
- Reconstruction of the Section of the Highway P108 Ventspils-Kuldīga-Saldus (Km 76.70-80.20).
- Reconstruction of the Section of National Local Road V1457 Annenieki-Jaunpils (km 0.025-4.37).
- Reconstruction of the Section of National Regional Road P120 Talsi-Stende-Kuldīga (km 6.5-8.6).
- Reconstruction of the Road Opūgi-Runcavnieki in Riebiņi Municipality.
- Reconstruction of Grobiņa Stadium and its Infrastructure.
- Intersection of Torņa Street in Sece with the Regional Road P76 in Jaunjelgava Municipality.

Analysing the wide range of topics, it can be concluded that both teaching staff and students demonstrate their skills, knowledge and competences at a very high level and in line with the topicality of the field. The choice of topics is based on the student's interest in current

developments in the field and on the student's preferences for future career choices, and the final thesis topics owe to the sustainability and development of the programme as a whole.

In the reporting period, final grades for the graduate papers were in the range from grades 6 to 9. The final grade is made of the grade ascribed by the reviewer, which contributes 50% to the grade, and the evaluation of the Viva Voce Examination Committee, which contributes the other 50%.

3.3. Resources and Provision of the Study Programme

3.3.1. Assessment of the compliance of the resources and provision (study provision, scientific support (if applicable), informative provision (including libraries), material and technical provision, and financial provision) with the conditions for the implementation of the study programme and the learning outcomes to be achieved by providing the respective examples.

RTU Faculty of Civil Engineering (FCE) continuously monitors compliance to quality requirements of rooms and technical equipment, the appropriate lecture halls with necessary multimedia hardware have been equipped. In order to ensure the qualitative study process, FCE is carrying out extensive refurbishment works, upon their completion the Faculty will meet international standards for campuses and lecture halls. Classification of the premises is given in the table below.

Room type	Number of rooms	Useful area m²
Meeting room	1	70.91
Computer rooms	4	243.77
Auditoriums	23	1702.34
Teachers' rooms, cabinets	69	1523.61
Assistant professor / Doctoral student premises	5	196.24
Workspace / workshop	6	172.19
Research facilities	6	350.53
Laboratories	35	1256.83
Resource room	6	213.53
Auxiliary room	11	197.99

Anteroom	3	35.89
Student self-government and record keeping	3	260.43
Kitchen	1	16.43
Total		**6240.69**

FCE institutes provide education and learning support: develop and update descriptions of the study courses, implement the corresponding study courses (including practical and laboratory works and seminars), supervision and defence of the graduate papers, and other activities related to learning, teaching and research work.

In 2017 – 2020, substantial investments were made in the research infrastructure. For example, the Institute of Transport Engineering had acquired such equipment as a Hamburg testing device (automatic Hamburg two-wheel tracker), as well as a roller-compactor, a four-point fatigue testing machine (four-point beam bending machine), a drone with infrared camera for open-air drone-based measurements and reading, as well as a high-resolution camera for additional imaging. In 2021, the Institute of Materials and Structures in cooperation with the largest manufacturer of construction materials in Latvia – “Sakret” Ltd., established a new laboratory – 3D concrete printing laboratory equipped with a 3m x 3m concrete 3D printer. In 2020, FCE founded the Centre for Digital Building Technologies that carries out active research and training in Building Information Modelling (BIM).

The Scientific Library of RTU (Scientific Library | Riga Technical University (rtu.lv)) is an academic library of state significance, which has obtained its status as a result of library accreditation. The Scientific Library of RTU provides the necessary information for RTU study process and research activities, performs library, bibliographic and information services for RTU students, teaching staff, and employees. The Library's collection includes 1.4 million printed documents and e-resources in the databases relevant to RTU fields.

In 2016, significant investment was made in the development of the library infrastructure, with the construction of an additional 2240 m2 of space for the Central Library. The total area of the library premises is 6393 m2, of which 3417 m2 are for reader services. There are 713 workstations for library users. The library has four group rooms and six individual cubicles, a Western reading room and a conference room. The library is accessible to users with reduced mobility.

To improve the work of the Scientific Library of RTU and to ensure the availability of information needed for study and research work, the Library Council has been established, which decides on the replenishment of the library's collection with printed publications and subscriptions to the necessary databases. The Library Council has approved the "RTU SL Collection Completion Policy", which defines the basic principles of collection formation and development in accordance with the directions of RTU study and scientific activities.

When RTU provides funding for the library, the funding for information resources for each study programme is calculated. The collection is replenished according to the recommendations of the heads of study programme, researchers, and the allocated funding. The desired titles can be ordered by contacting the Library's Collection Development Department, ordering on the Library's website, filling in the order form, filling in the application form, by phone or by visiting the Library. The Scientific Library offers a guide to ordering titles and e-resources, which brings together the

websites of various publishers and bookshops in Latvia and abroad.

Database subscription contracts are concluded both directly with the supplier and through the "Cultural Information Systems Centre" state agency, which is the Latvian national representative of the international non-profit organisation EIFL (Electronic Information for Libraries, http://www.eifl.net/). The EIFL Licensing Programme offers national libraries subscriptions to internationally recognised databases at significantly reduced subscription fees not offered to individual subscribers, thus saving financial resources of the libraries.

The database subscriptions maintained by RTU Scientific Library

(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.
- Databases financed by the Ministry of Education and Science available to RTU Scientific Library: ScienceDirect, SCOPUS (Elsevier), Web of Science.
- Latvian databases: LETA, Letonika, the Database of Latvian Standards (available on the premises of the Library).

Database usage at the Scientific Library of RTU has been growing since 2016. E-resource loans have increased from 75,391 to 525,194 items.

The new library premises have allowed to extend the range of services. Since the opening of the new premises in 2018, the number of visits to the library has increased from 103,825 to 235,600. The Scientific Library of RTU is open to everyone. The Central Library is open to users from Monday to Saturday. There is a 24/7 reading room. During the summer period, the Central Library is open every weekday with reduced opening hours. (https://www.rtu.lv/writable/public_files/RTU_library_general_info_2020.pdf)

The library's sources are housed in an open-access collection. Books and periodicals according to the field of study and the UDC indexes are located in the central building of the Scientific Library, 5 Paula Valdena Street, Riga. The last copies of the oldest publications corresponding to the RTU profile are kept in the library repository. They are always available to the users.

The librarian on duty helps visitors find their way around the collection. Bibliographers (information specialists) provide more detailed information and advice. The library has a branch librarian service (https://www.rtu.lv/lv/studijas/biblioteka/nozaru-informacija (In Latvian)).

The library resource search is supported by the Primo Discovery search tool (https://www.rtu.lv/lv/studijas/biblioteka/vienota-informacijas-meklesana (In Latvian)). It allows searching the library catalogue (https://kopkatalogs.lv/F/?func=find-b-0&local_base=rtu01 (In Latvian)), the subscribed databases, as well as databases created by the RTU Scientific Library (https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/bibliotekas-veidotas-datubazes (In Latvian)) in one interface. Searching for information in the electronic joint catalogue (https://kopkatalogs.lv/F (In Latvian)), it is possible to simultaneously obtain information on the resources available in 12 Latvian libraries. Both the electronic catalogue and the RTU portal ORTUS allow remote reservation of library resources, as well as remote access to the databases. Since the introduction of RFID technology, users can use five self-service book-dispensing machines and check out books from the pick-up machines around the clock.

The library provides students, academic personnel and other stakeholders with various levels of individual consultations and group training in information literacy

(https://www.rtu.lv/lv/studijas/biblioteka/lietotaju-apmacibas (In Latvian)).

Publications not available in the library are delivered via an interlibrary loan or an international loan.

Internet access is available throughout the library. The library has copying, scanning, printing, binding services and a self-service dining room.

Students, whose permanent residence is outside Riga or Pieriga, are offered accommodation at RTU hotels. These services are also available for incoming students and guest professors. In addition, RTU has also cooperation agreements with other accommodation providers to offer guests the desired level of comfort, if necessary.

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

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

Both state budget financing and student funds will be used for the implementation of the study programme. Information on the expected financial resources of the programme is presented in Table 3.3.3.

Table 3.3.3.

Academic year	State budget funding for the programme, EUR	Tuition fees, EUR	Total study programme funding, EUR	Cost per student, EUR
2016./2017.	92293,05	78514,42	170807,47	3479,42
2017./2018.	114122,11	67254,36	181376,47	3636,59
2018./2019.	118904,47	53194,83	172099,3	3806,71
2019./2020.	51105,51	38332	89437,51	3964,53
2020./2021.	125039,57	17943,21	142982,78	4016,53

The analysis of the information shows that the state budget grants for the study programme have increased during the reporting period. The cost per student has increased, which is justified by the overall increase in total RTU costs (utilities, building maintenance, etc.).

Information on the minimum number of students in RTU study programmes is provided in the appendix of the self-evaluation report "On minimal number of students in study programmes".

Tuition fees are set in line with the National Audit Office's warning that tuition fees for students studying with budget students cannot be less than the public funding for this service. Part-time extramural studies do not receive State funding, so tuition fees are set taking into account a number of factors, such as the programme's ability to cover its costs, the market situation, demand for the programme, the stage of development of the programme, etc.

Information on the funding distribution between the cost items is provided in the appendix of the self-assessment report "Funding distribution between the cost items".

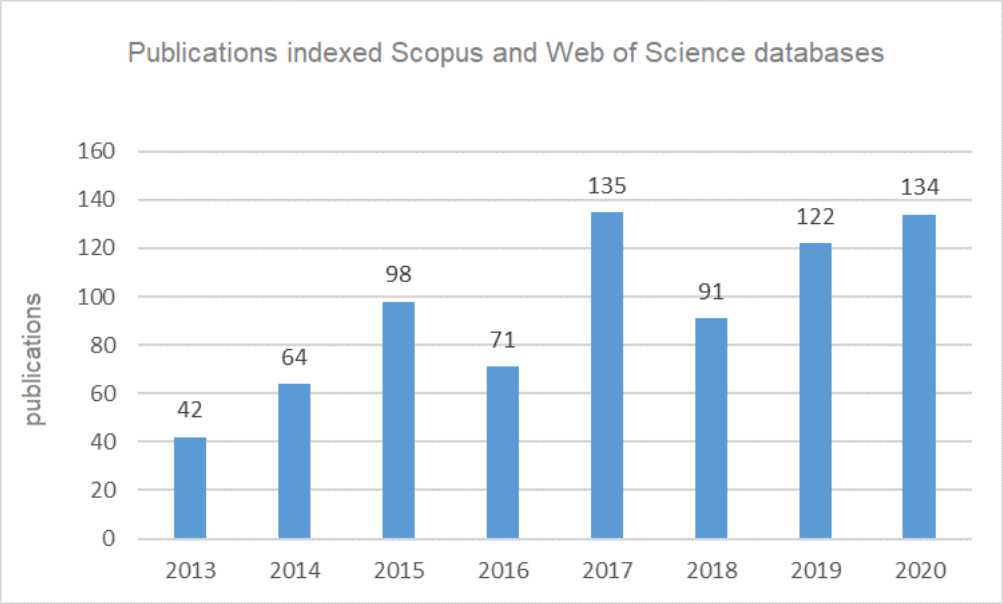
The specific development of each study programme is the responsibility of each study programme director, as well as the faculty responsible. For the development of all study programmes, central funding is used for the renewal of the research library, improvement and maintenance of shared classrooms, public relations, programme marketing activities, development and maintenance of information systems related to the study process, development of the Ķīpsala complex and other activities.

3.4. Teaching Staff

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

RTU Faculty of Civil Engineering employs highly qualified academic staff. This is characterised by a high number of publications during the reporting period. For example, in the period of 2013-2020, a total of 757 articles were published in journals cited in the Web of Science and SCOPUS databases. The dynamics of the number of publications by year is shown in Figure 3.4.1.

Figure 3.4.1.



The following qualitative and quantitative indicators show that the qualifications of the academic staff meet the requirements specified in Section 55 of the Law on Higher Education Institutions - 17 professors and associate professors, who have been elected to academic positions at RTU organisational units and are experts in their field approved by the Latvian Council of Science, participate in the implementation of the compulsory part and the limited elective part of the study programme.

The academic staff regularly improves their professional and academic knowledge at methodological seminars, conferences (national and international), by performing scientific and research work, as well as by participating in various projects.

13 professors of the Faculty of Civil Engineering participate in the implementation of the study programme, examples of their achievements include:

Professor **Leonīds Pakrastiņš** received his Doctoral degree in Engineering from Riga Technical University in 2005. Professor Leonīds Pakrastiņš specialises in concrete, composite and masonry structures. He has worked in the EUROCODE normative base implementation group. Member of the Panel of Reviewers of several scientific journals - ASCE Journal of Structural Engineering ISSN: 0733-9445, ELSEVIER journals Construction and Building Materials ISSN: 0950-0618 and Fire Safety Journal ISSN: 0379-7112. Author of 105 publications.

Professor Dmitrijs Serdjuks has participated in more than 60 international conferences and published more than 100 scientific and methodological papers. He is an expert of the Latvian Council of Science in the field of Construction Science. He is currently leading the research project “Method of Correlation of Coaxial Accelerations in 6-D Space for Quality Assessment of Structural Joints (COACCEL)” funded by the Latvian Council of Science, has participated in the international mobility programme "Visiting Professors Programme”, Peter the Great St. Petersburg Polytechnic University, within the framework of teaching, research, scientific activity and collaboration. In 2019–2020 academic year, he has been awarded the titles of RTU Professor and RTU Honorary Employee for many years of conscientious and active work at the University.

Professor Aleksandrs Korjakins received his Doctoral degree in Engineering from Riga Technical University in 1997. Professor Aleksandrs Korjakins specialises in the fields of high-performance concrete, ecological building materials, material recycling and expertise in building structures. He is actively involved in international cooperation, as evidenced by his activities as a member of

editorial boards of international journals – Environmental Engineering and Management Journal; Journal of Sustainable Architecture and Civil Engineering, (Lithuania, Kaunas), Advances in Ceramic Science and Engineering (ACSE), Journal of Construction & Building Materials (Elsevier) and Zeitschrift für Angewandte Mathematik und Mechanik (ZAMM). He is the author of 210 publications.

Professor Ainārs Paeglītis received the degree of Candidate of Technical Sciences from Riga Polytechnic Institute in 1992 and the degree of Doctor of Engineering Sciences from Riga Technical University in 1992. Professor Paeglītis specialises in the fields of bridge structure safety and durability, dynamic properties of bridges. Professor Paeglītis is the Editor-in-Chief of the Baltic Journal of Road and Bridge Engineering (https://bjrbe-journals.rtu.lv/). He has led 19 projects at RTU and is the author of 91 publications.

Professor Modris Dobelis received the degree of Candidate of Technical Sciences from the Institute of Polymer Mechanics of the Latvian Academy of Sciences in 1985 and the degree of Doctor of Engineering Sciences from Riga Technical University in 1992. Professor Dobelis specialises in structural calculations and graphical representation of their results, and was one of the first in Latvia to start teaching the principles of building information modelling. Modris Dobelis has been actively involved in international cooperation, for example, in the period from 2002 to 2008 he was the President of the Baltic Association for Geometry and Graphics BALTGRAF, a member of the editorial board of the Polish journal "The Journal Biuletyn of Polish Society for Geometry and Engineering Graphics". Author of 78 publications.

Professor Atis Zariņš received his Doctoral degree in Engineering from Riga Technical University in 2006. Professor Zariņš specialises in spatial design of highways and bearing capacity of pavements. Author of 26 publications.

Professor Juris Smirnovs received the degree of Candidate of Technical Sciences from Moscow Road Institute in 1989 and the degree of Doctor of Engineering Sciences from Riga Technical University in 1992. Professor Smirnovs specialises in road safety and pavement research. Professor Juris Smirnovs is the editor of the Baltic Journal of Road and Bridge Engineering. Author of 59 publications.

Four Associate Professors of the Faculty of Civil Engineering holding the degree of Doctor of Engineering Sciences participate in the implementation of the study programme:

Associate Professor Līga Gaile received her degree of Doctor of Engineering Sciences from Riga Technical University in 2014. Associate Professor has participated in the execution of the national implementation plan of Eurocode standards and the development of national annexes, as well as in the improvement of the technical regulation in the field of building structures as a member of the Eurocode Subcommittee of the Latvian Technical Committee for Standardisation LVS/STK30 "Construction". Her scientific research is related to the study of oscillatory problems of complex building structures. Author of 51 publications and 1 Latvian patent.

Associate Professor Jānis Šliseris received his degree of Doctor of Engineering Sciences from Riga Technical University in 2013. After obtaining his Doctoral degree, the Associate Professor undertook internship at the Fraunhofer Institute for Industrial Mathematics (Fraunhofer ITWM), Kaiserslautern. His research interests are related to the analysis of wood material properties and the development of new composite materials. Author of 3 Latvian patents and 48 publications.

Associate Professor Andīna Sprince has been awarded a PostDoctoral Support Grant and will start the project in May 2020. She has co-authored 28 scientific publications, presented papers at 27 international scientific conferences, including 1 methodological conference. A. Sprince is co-author of Latvian patent and 7 methodological teaching aids. Expert of the Latvian Council of Science in the field of Construction Science. She has participated in the implementation of projects

of the Latvian Council of Science, the Ministry of Education and Science and other institutions. A. Sprince has improved her qualification by 6-month internship at the Technical University of Denmark. She is an editorial board member of several scientific journals. Last year she was awarded the AFW Academy International Certificate in Project Management. She regularly participates in various scientific and academic seminars to improve her qualifications. She is a member of the State Examination Committees of the Faculty of Civil Engineering and the Faculty of Architecture at RTU. She is a scientific adviser of graduation papers at the Doctoral, Master and Bachelor (with an engineering project) level.

The above information on each of the faculty academic staff, as well as the faculty academic staffs' biographies, demonstrate their high level of qualification and their ability to ensure the quality of the stage courses in both streams and the quality of the programme as a whole. Many of the lecturers are also active in the Civil Engineering industry – both building constructions and road constructions, which also helps to translate their practical knowledge and competences into achieving the objectives of the programme. The programme's academic staff contribute to the achievement of the learning outcomes through their qualifications and their knowledge and skills.

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

13 professors – Doctors of Science, whose scientific and academic qualifications corresponds to the regulations on the criteria for the election in the professor position, are involved in the implementation of the college study programme.

4 elected associate professors – Doctors of Science, whose scientific and academic qualifications corresponds to the regulations on the criteria for the election in the position of an associate professor, are involved in the implementation of the study programme.

Furthermore, 10 assistant professors, 3 leading researchers and 6 lecturers are involved in the implementation of the study programme.

During the reporting period, the changes were considerable, on the whole, 8 new members of the academic staff were additionally involved in the programme implementation, however, the number of associate professors has reduced. Analysis showed that this happened for a variety of reasons:

1. The associate professors and assistant professors advanced their qualifications over the reporting period and became professors or associate professors, respectively;
2. The academic staff took part in grant competitions, and received funds and opportunities to conduct the research in the field, thus changing their academic position to a leading researcher position;
3. New industry specialists were recruited to promote introduction of advanced technologies in the study courses; thus, lecturers and assistants came to work in the programme.
4. Retirement of the academic staff;
5. Termination of employment due to commencing work in the construction sector thus improving own qualification.

The overall changes during the reporting are given in the table:

Academic position	Academic year 2016/17	Academic year 2020/21
Professor	6	13
Associate professor	5	4
Assistant professor	10	10
Lecturer	2	5
Leading researcher	1	3

The table shows that the programme involves new qualified members of the academic staff, thus maximally adjusting the programme curriculum to the specifics and latest development in the sector.

Within the Faculty, targeted measures are taken to ensure that changes in the composition of the teaching staff have a positive impact on the development and quality of the study programme, as well as compliance with the requirements set out in the regulatory enactments. Changes in the content of the study programme and the addition of new study courses to the programme, which are more in line with the development of the field, have also successfully influenced the achievement of the programme objectives and the acquisition of new study courses.

Currently, RTU is implementing SAM 8.2.2 project on "Strengthening of Academic Personnel of Riga Technical University in Strategic Specialisation Areas" financed by the European Social Fund, one of the tasks of which is the renewal of academic personnel. The aim of the project is to strengthen RTU academic personnel in the areas of strategic specialisation in 10 study fields, including the study field "Architecture and Civil Engineering". The project activities are focused on three areas:

- Involvement of Doctoral students in the work of the academic staff at RTU;
- Involvement of foreign academic staff in the work of the academic staff at RTU;
- Improvement of the existing academic staff qualifications, including academic staff internship at an economic operator.

Within the project, academic staff have an opportunity to develop their competence at the courses in professional English, as well as specialized training courses.

In order to ensure and increase the impact of scientific activities and personnel development, RTU management signs an annual agreement with each RTU faculty, which sets specific quantitative indicators in the areas of studies, scientific activities and valorisation.

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

has the status of an expert and expiration date of the Latvian Council of Science expert) (if applicable).

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

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

Within the study programme, there is a cooperation stimulation mechanism for academic staff that provides enhancement and integration of the study courses. Both student survey results and alumni survey results allow getting feedback, which identifies certain shortcomings. Thus, the study courses are improved on a regular basis, considering both student suggestions and industry development trends.

In the process of study programme implementation, close cooperation of academic staff takes place, which is also manifested in the following activities:

1. Discussion of the results and quality of the reviews at the department meeting, discussing the evaluation criteria and ways to improve the quality of the graduate papers.
2. Interconnection of lectures and practical classes, discussion of strengths and weaknesses afterwards.
3. Joint attendance of methodological seminars, which are held in an interactive way, where academic staff share their experience and discuss the latest scientific and professional trends, as well as psychological and pedagogical techniques and methods for improving the study process.
4. Cooperation within the projects, where the experience gained is used by the academic staff in the study process.
5. Joint study tours, where academic staff and students learn about current developments in the field and apply practical case studies in classroom sessions.

The student-faculty ratio at the study programme at the time of submission of the self-evaluation report is 35/40 or one member of the academic staff to one student.

Cooperation of the academic staff within the study programme is considered to promote achievement of the learning outcomes. Reviewing and updating the study programme, the academic staff mutually agree on the most appropriate and effective solutions for evaluation of the

learning outcomes and achievement of performance indicators. Periodical discussions and review of the study course syllabus help achieve thematically harmonized and complementary training, avoiding duplication of questions discussed in different courses within one study programme.

Annexes

III - Description of the Study Programme - 3.1. Indicators Describing the Study Programme		
Sample of the diploma and its supplement to be issued for completing the study programme	RBKB0.zip	RBKB0.zip
For academic study programmes - Opinion of the Council of Higher Education in accordance with Section 55, Paragraph two of the Law on Higher Education Institutions (if applicable)		
Compliance of the joint study programme with the provisions of the Law on Higher Education Institutions (table) (if applicable)		
Statistics on the students in the reporting period	Annex 5.pdf	5. pielikums.pdf
III - Description of the Study Programme - 3.2. The Content of Studies and Implementation Thereof		
Compliance with the study programme with the State Education Standard	Annex 6.pdf	6. pielikums.pdf
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard or the requirements for professional qualification (if applicable)	Annex 7.pdf	7. pielikums.pdf
Compliance of the study programme with the specific regulatory framework applicable to the relevant field (if applicable)	Compliance the specific regulatory framework.pdf	Atbilstība specifiskajam normatīvajam regulējumam.pdf
Mapping of the study courses/ modules for the achievement of the learning outcomes of the study programme	Annex 8.pdf	8. pielikums.pdf
The curriculum of the study programme (for each type and form of the implementation of the study programme)	Annex 9.zip	9. pielikums.zip
Descriptions of the study courses/ modules	RBKB0_EN.zip	RBKB0_LV.zip
Description of the organisation of the internship of the students (if applicable)	Internship_Management_Procedure.pdf	Prakses_organizesanas_kartiba.pdf
III - Description of the Study Programme - 3.4. Teaching Staff		
Confirmation that the academic staff of the doctoral study programme includes not less than five doctors, of which at least three are experts approved by the Latvian Council of Science in the branch or sub-branch of science in which the study programme intends to award a scientific degree (if applicable)		
Confirmation that the academic staff of the academic study programme complies with the requirements specified in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions (if applicable)		

Innovative Solution in Geomatics (45581)

Study field	*Architecture and Construction*
ProcedureStudyProgram.Name	*Innovative Solution in Geomatics*
Education classification code	*45581*
Type of the study programme	*Academic master study programme*
Name of the study programme director	*Jānis*
Surname of the study programme director	*Kaminskis*
E-mail of the study programme director	*janis.kaminskis@rtu.lv*
Title of the study programme director	*Asoc. profesors/Dr.sc.ing.*
Phone of the study programme director	
Goal of the study programme	*The aim of the study is to provide in-depth education in modern problems of geodesy, cartography, photogrammetry, land management, to acquire the latest specialized software and practical skills in working with the latest electronic instruments.* *s well as to prepare students for independent work in scientific research; to prepare students for further doctoral studies; to prepare students for pedagogical work in higher education institutions; to prepare students for independent practical work.*
Tasks of the study programme	*to provide students with a wide range of professional, practice-oriented education, which gives an opportunity to easily adapt to the labor market, as well as to carry out scientific research work, as well as to continue education in doctoral studies;* *• to create an opportunity for students to obtain a qualification directly related to their future work, to provide opportunities for the acquisition of theoretical knowledge and skills that would allow graduates to start practical activities after graduation the program;* *• to master the techniques of scientific research in the main directions of geomatics;* *• to strengthen the ability to work with the latest tools and to expand the acquisition of specialized software;* *• to strengthen and expand the ability to connect theoretical knowledge with solving practical problems;* *• to acquire skills to perform pedagogical work in higher education institutions;* *• to develop the ability to work in a team and work with professionals in various fields, to provide an opportunity to develop foreign language skills, which would ensure the ability to cooperate with colleagues from other countries.*

Results of the study programme	*- is able to demonstrate the basic and specialized knowledge characteristic of the geomatics sub-sector of the field of construction science and a critical understanding of this knowledge, moreover, part of the knowledge corresponds to the highest level of achievement in geomatics;* *- is able to show the understanding of the most important concepts and regularities of the geomatics sub-branch of the field of construction science;* *- is able, using the acquired theoretical foundations and skills, to perform professional, innovative or research activities, to formulate and analytically describe information, problems and solutions in geomatics, to explain them and discuss them with arguments;* *- is able to work independently on his / her own improvement, show a scientific approach to problem solving, take responsibility and initiative, working individually, in a team or leading the work of other people, make decisions and find creative solutions in changing or uncertain working conditions;* *- is able to independently obtain, select and analyze information and use it, make decisions and solve problems, show that he / she understands professional ethics;* *- knows the technologies and methods for performing study tasks or work tasks;* *- is able to plan and organize work, use various methods, technologies, tools to perform tasks;* *- is able to demonstrate comprehensive knowledge of facts, theories and regularities necessary for personal growth and development, civic participation, social integration and further education;* *- is able to understand and demonstrate in detail a variety of specific facts, principles, processes and concepts in a particular field of study or professional activity in standard and non-standard situations;* *- is able to manage geodetic and cartographic works; participates in the performance of specific works and may manage these works; - knows the certification procedures and requirements for surveyors and is able to take certification exams;* *- is able to process geodetic data in accordance with the specified requirements;* *- is able to use modern technologies to perform various tasks;* *- is able to independently solve more topical problems in the fields of geodesy and cartography;* *- is able to defend and substantiate the results of research work;* *- is able to participate in national and international projects;* *- ensure effective communication and liaison with industry.*
Final examination upon the completion of the study programme	*Master Thesis*

Study programme forms

Full time studies - 1 years, 6 months - english

Study type and form	*Full time studies*
Duration in full years	*1*
Duration in month	*6*
Language	*english*
Amount (CP)	*60*
Admission requirements (in English)	*bachelor degree in geodesy, cartography, geomatics, geography, land management, forestry or geology, or comparable education. Applicants must have English language proficiency as evidenced by the results of international English proficiency tests or other evidence of English language proficiency, or a grade in English in a previous education document, or a grade in the entrance examination, unless previous education in English.*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Master of Engineering 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

3.1. Indicators Describing the Study Programme

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

The Academic Master Study Programme "Innovative Solutions in Geomatics", education classification code 45581. Accredited by the decision of the Accreditation Commission of LR Ministry of Education and Science of 29 May, 2017 – accreditation certificate No. 2020/39.

The recommendations made for improvement of the study programme in the previous period have been taken into account and the following amendments have been made:

- The content of the study programme to be accredited has been updated through the implementation of uniform programme management, learning outcome assessment procedures, in particular as regards the Master Thesis. Changes have been made in line with the latest trends in the sector;
    - The content of study courses has been improved by existing standards to improve the quality and compliance of the study programme with the highest education standards at the European level.
    - the quality control process is being improved, including the Master Thesis, by developing feedback at all stages of the quality system assessment, based on information provided by stakeholders;

Improvement and amendments to the study programme are described in detail in Annex "Review of recommended amendments within the study programme "Innovative Solutions in Geomatics".

The programme is implemented on the full-time basis.

The academic Master study programme "Innovative Solutions in Geomatics" is implemented by Riga Technical University (RTU) and Vilnius Gediminas Technical University (VGTU), following the agreement of 17 March 2014 on the implementation of a joint aforementioned study programme in English.

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

The Master's academic study program "Innovative Solutions in Geomatics" has been developed in accordance with the Law on Higher Education Institutions of the Republic of Latvia, in

accordance with the Classification of Education of the Republic of Latvia, in accordance with Cabinet Regulation No. 512 “Regulations on the Second Level Professional Higher Education State Standard” and the decision “On Uniform Requirements for Study Programs of Riga Technical University” adopted at the RTU Senate meeting on March 23, 2015.

Volume of the program - the volume of the study program and its structural distribution is in accordance with the state education standard. The amount of the program and study courses is expressed in credit points.

Structure of the study program

1. Compulsory study courses 28 CP

2. Compulsory elective courses 12 CP

3. There are no free choice courses

4. There is no practice

5. Master's thesis 20 CP

A total of 60CP

The general goal of the academic master's study program "Innovative Solutions in Geomatics" is to provide a set of theoretical knowledge and practical skills so that students achieve a broadly internationally recognized competence corresponding to the master's degree. The goal of the program is:

- to provide students with a wide, professional, practically oriented education, which gives an opportunity to easily adapt to the labor market, as well as to carry out scientific research work;
- to provide students with theoretical and practical training corresponding to the fifth level of professional qualification, which gives an opportunity to obtain the qualification of a geodesist or cartographer, as well as to continue education in doctoral studies;
- to create an opportunity for students to obtain a qualification closely related to their future work, to provide opportunities for the acquisition of theoretical knowledge and skills that would allow graduates to start practical activities after completing the program, to perform the duties of a geodesist or cartographer;
- to ensure the acquisition of modern general knowledge, to develop economic and professional thinking, to promote students' analytical abilities, to develop skills in solving professional problems and tasks, to develop projects that would allow graduates to get involved in solving problems of economic activity;
- to develop the ability to work in a team and work with professionals in various fields, to provide an opportunity to develop knowledge of foreign languages, which would ensure the ability to cooperate with colleagues from other countries.

The content and scope of the examinations correspond to the content specified in the subject programs and the requirements for professional qualification skills and knowledge. All conditions for obtaining credit points are described in the program of each subject. The Master's professional study program "Geomatics" is implemented in lectures, practical classes, measurements - in previously prepared field landfills or specially equipped geodetic measurement auditoriums, as well as in independent studies, learning the basics of geodesy and cartography and its connection with other relevant economic sectors. All study courses included in the study program are related to the goals and tasks of the study program “Geomatics”, as well as to the results to be achieved. When acquiring study courses, students must acquire knowledge, skills and competencies determined by professional standards. Analyzing the connection of the goals of the study program, the results to be achieved with the information included in the study courses, the results to be achieved, the set

goals and other indicators, and their compliance with the Cabinet of Ministers Regulations No. 512 “Regulations on the second level professional higher education August 26, it can be concluded that:

- The strategic goal of the study program is developed in such a way as to provide professional studies corresponding to the economic, cultural, national defense and security, as well as social needs, based on the theoretical foundations of the branch sciences, geodesy and cartography professions and applicable in practice;
- The content of the study program provides a set of knowledge, skills and competence in accordance with the 6th level knowledge, skills and competence of the framework specified in the Latvian education classification. The main parts of the program are: study courses; study practice outside the educational institution (in the text - practice); a state examination, a part of which is the elaboration and defense of a master's thesis.

General tasks of the study program:

- to provide competitive master's higher education in accordance with international standards and to prepare students for practical work, to develop skills of scientific research work and to promote their use;

- to provide students with comprehensive knowledge in the field of geomatics, to develop specialist skills and develop competencies in accordance with the requirements of the labor market;

- to promote interest in further education and development, supplementation of academic and professional knowledge;

- to stimulate students' interest in the processes taking place in society, to stimulate the development of students into a positive, modern, responsible and capable personality who is able to act independently and make decisions independently;

- to ensure the development of the content of the study program, the study process, scientific research work and changes in accordance with the latest technologies and findings in the fields of geomatics, geodesy, international practice, science and didactic practice;

- to promote the interaction of the academic staff and students in the performance of scientific research work and in the practical use of the obtained results in accordance with the international standards and tendencies in the geomatics sub-sector of the construction industry;

- to promote and develop the international exchange and participation of academic staff and students in projects.

Measurements of the results of the tasks are student study results, graduate employment rates and feedback from employers, expansion of international cooperation, increase in the number of research projects and increase in the number of students involved in the research process, as well as approbation of research results in companies, etc.

The tasks of the study program are designed to educate students, ensuring the acquisition of a fifth level professional qualification in geodesy or cartography, which is in line with the 6th EQF level, as well as to promote their competitiveness in the changing working environment and international labor market.

Professional standard (geodesy and cartography engineer. Kartogrāfijas inženiera profesijas standarts (visc.gov.lv) and https://registri.visc.gov.lv/profizglitiba/dokumenti/standarti/ps0431.pdf in Latvian) requirements, after their evaluation by the Construction Industry Expert Council, have been included in the Construction Industry Qualifications Framework and will be further developed. Consequently, additional changes and additions will be made to the descriptions of study courses. The study system is designed in accordance with the Law on Education, the Law on Higher

Education Institutions and the Law on Vocational Education, so that it maximally promotes the achievement of the goals set in the study programs and facilitates the fulfillment of tasks. The study system at the university is internally regulated by the documents regulating the relations between students and the university and the documents regulating the course and organization of studies, which are available at the program administration and virtually on the RTU website.

At the beginning of the studies, students receive a short informative material, which contains the most important information for the student about the organization and practical implementation of studies. In order to ensure the achievement of the goals and tasks set for the program, compulsory study courses, general education study courses and common study courses are acquired in the first and second study years, which form the basis for the acquisition of special knowledge and practical skills during further studies. The content of the Master's program is designed in accordance with these standards and fulfilling their requirements. The content of the compulsory part and the compulsory optional part of the study program meets the requirements of the professional standards. During the development of the standard of the profession of geodesy and cartography, the opinions were coordinated between future and existing employers and representatives of Latvia's largest universities, as the working group for the development of the profession standard included representatives from the Latvian Surveyors Association (LMB), Latvian Association of Cartographers and Surveyors representatives.

In accordance with the new version of the state standard and the decision adopted at the RTU Senate meeting on March 23, 2015 “On the unified requirements for study programs at Riga Technical University”, improvements in the study program structure have been developed in cooperation with employers and program advisors. as well as by making substantive changes in the study courses in order to ensure their compliance with the requirements of the modern life situation and the standard of the profession. In order to meet the goals of the Latvian state's economic policy, the new labor market needs such an education and employment policy that would ensure the full use of human resources, thus creating a productive basis for economic growth.

The study content is reflected in the program of each study course. The content of the subject program of the study program “Geomatics” is reviewed once a year to update the content of the study course, taking into account the changes in the field and daily necessities, which are also provided by the study program of each study subject.

2018/2019 A mapping has been performed in the study year, in which the interaction of the goals and results to be achieved with the requirements of the professional standard and the goals of the study program is analyzed. The analysis of this matrix allowed to find the places in the descriptions of study courses that need to be improved. When presenting the developed matrix or mapping, suggestions were received, which allow to improve the study courses. Academic staff, whose study courses are included in the study plans of the autumn or spring semester of the given academic year in all higher level study programs in full-time and part-time studies, place subject plans in the ORTUS e-learning environment, which include lesson topics for all lectures and practical work. laboratory work, etc., as well as the conditions for obtaining a successful assessment in the study course, which describes all the requirements that a student must meet in order to obtain a successful assessment of the subject (for example, information on planned tests and independent work assignments which may affect the assessment of the student 's work). In order to ensure the interaction of knowledge, competencies and skills acquired by graduates, special emphasis is placed on the development and implementation of study courses:

1) to reflect current problem situations in the content of the study program (at the level of lectures, practical work), incl. analysis of the real situation of the study program and provision of solutions within the content framework of the specific course;

2) for the use of modern teaching methods (solutions of specialized data programs, use of a unified solution algorithm, solution-oriented methods, programming, etc.);

3) the integrity of the study course and the study program, i.e. developing an inter-course learning approach (for example, for the inter-course learning approaches of the study courses Higher Geodesy and Astronomy, using tools for determining coordinates, their interpretation, etc.);

4) for the improvement of study methods in cooperation with foreign experts (for example, Vilnius Gediminas Technical University) for a distance learning form, using the e-learning environment ORTUS of Riga Technical University (RTU).

Individual access for students is provided:

1) study materials are provided both in the form of handouts and electronic materials and presentations;

2) if necessary, the lecturer plans individual meetings and consultations with the student, because each lecturer has a consultation schedule, which students are introduced to in the first lecture, in the RTU ORTUS system lecturers must indicate possible consultation times and if the student needs consultations, apply for the relevant times, as well as consultation times are available at geomatika.rtu.lv;

3) the individual approach is observed in the selection of the applied teaching methods, analysis of individual topics and problems during lectures, practical work, laboratory work and seminars;

4) when choosing the topic of the master's thesis, the student's wish and the specifics of the work in the chosen specialization are taken into account;

5) intensive and regular electronic communication takes place both in the electronic mail, in the ORTUS environment and on the website.

When implementing the study program, its goal corresponds to the European Qualifications Framework (EQF) level 6 and the Latvian Qualifications Framework (LQF) level 5 professional qualification and is achieved.

During the implementation of the program, mutual feedback is regularly provided. Students receive regular feedback from the lecturers on the submitted tests, course, exam, study projects, reports, practice reports and presentations. In the middle and at the end of the study course, the lecturers can conduct a survey on students' satisfaction with the content of the course, their wishes, as well as listen to suggestions.

The Department of Geomatics of the Institute of Transportation Engineering of the Faculty of Civil Engineering of Riga Technical University (RTU) closely cooperates with professional associations – Latvian Association of Surveyors, Latvian Association of Cartographers and Geodesists, which are active participants of the international organisations (associations) – the International Union of Geodesy and Geophysics (IUGG), the International Federation of Surveyors (FIG) and the Council of European Geodetic Surveyors (CLGE), and Latvia’s GIS Association (LATGIS), which is a member of the European Umbrella Organisation for Geographic Information (EUROGI). The Department of Geomatics of the Institute of Transportation Engineering of the Faculty of Civil Engineering at RTU has been an academic member of the International Federation of Surveyors (FIG) already since 1999.

The academic Master study programme is innovative, it focuses on educating and training specialists in the field of geomatics, with extensive expertise in engineering issues, for work at companies in different sectors and public administration institutions. The acquisition of skills and knowledge provided for in the study programme is ensured by academic and scientific staff at the

European level (EU and Latvian experts in the fields of engineering), who are involved on a daily basis in the delivery of civil engineering solutions at the national and European level. The academic Master study programme is unique in Latvia. There are no analogue programmes in the European Education Area. There are only a few similar programmes, and we believe that the competitiveness of the graduates of the programme is very high.

The title of the study programme, the awarded degree, the aims, tasks and learning outcomes, as well as enrolment requirements are interrelated and compatible.

Performance measurements are the student learning outcomes and independently developed Master Thesis of significant theoretical relevance and with practical application features, which include original scientific research results, demonstrate the competence to independently acquire, select and analyse information and use it to address geomatic (geodetic and cartographic) issues. The Master Degree is awarded after the completion of theoretical courses and public presentation of the Master Thesis in front of the State Examination Commission.

The implementation of the study programme focuses on the use of innovative technologies and their comprehensive assessment for sustainable economic development.

The results of the knowledge assessment of students at the academic Master study programme are discussed twice a year at the meetings of the Board of the Institute of Transportation Engineering. The results are also compiled and evaluated by the programme administration and they serve as a basis for further development of the study process. Regarding the quality of the Master Theses and their public presentation, the State Examination Commission provides its feedback, submitting a report to the study programme administration with recommendations regarding the defended Master Theses.

Alumni of the study programme:

- is able to demonstrate the basic and specialized knowledge characteristic of the geomatics sub-sector of the field of construction science and a critical understanding of this knowledge, moreover, part of the knowledge corresponds to the highest level of achievement in geomatics;
- is able to show the understanding of the most important concepts and regularities of the geomatics sub-branch of the field of construction science;
- is able, using the acquired theoretical foundations and skills, to perform professional, innovative or research activities, to formulate and analytically describe information, problems and solutions in geomatics, to explain them and discuss them with arguments;
- is able to work independently on his / her own improvement, show a scientific approach to problem solving, take responsibility and initiative, working individually, in a team or leading the work of other people, make decisions and find creative solutions in changing or uncertain working conditions;
- is able to independently obtain, select and analyze information and use it, make decisions and solve problems, show that he / she understands professional ethics;
- knows the technologies and methods for performing study tasks or work tasks;
- is able to plan and organize work, use various methods, technologies, tools to perform tasks;
- is able to demonstrate comprehensive knowledge of facts, theories and regularities necessary for personal growth and development, civic participation, social integration and further education;
- is able to understand and demonstrate in detail a variety of specific facts, principles, processes and concepts in a particular field of study or professional activity in standard and non-standard situations;
- is able to manage geodetic and cartographic works; participates in the performance of

specific works and may manage these works; - knows the certification procedures and requirements for surveyors and is able to take certification exams;
- is able to process geodetic data in accordance with the specified requirements;
- is able to use modern technologies to perform various tasks;
- is able to independently solve more topical problems in the fields of geodesy and cartography;
- is able to defend and substantiate the results of research work;
- is able to participate in national and international projects;
- ensure effective communication and liaison with industry.

The study programme promotes implementation of the leitmotif of Riga Technical University (RTU) as defined in its 2021-2025 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 educated and trains European and global-level engineers – leaders: developers of new technologies.” ((https://www.rtu.lv/writable/public_files/RTU_strategija_2021_2025_gadam_makets_26.10.2021_lv.pdf) in Latvian).

The study programme fully complies with the development aim of RTU Faculty of Civil Engineering – to become an internationally recognized leading Latvian educational, research and development institution in the field of civil engineering, providing high quality study process, internationally recognized research and sustainable innovation, commercialization and knowledge transfer for economic development.

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

Innovative solutions in geomatics prepare highly academically qualified specialists in the nationally demanded sectors of the country's regulated professions.

EuroGeographics Association, the Board of Surveyors The Council of European Geodetic Surveyors (CLGE) and Geometer Europas (GE) in order to raise the prestige of the surveyors profession and to assess the need for such professionals, conducted a study which showed that the labor market has a great demand for highly-qualified geoeducated staff, but, at the same time, requires a lot of effort at both national and European level in order to be prepare the best qualified professionals able to collect, process, analyze, and present spatial data and to apply innovative technologies and data processing techniques

is able to demonstrate the basic and specialized knowledge characteristic of the geomatics sub-sector of the field of construction science and a critical understanding of this knowledge, moreover, part of the knowledge corresponds to the highest level of achievement in geomatics;

is able to show the understanding of the most important concepts and regularities of the geomatics sub-branch of the field of construction science;

is able, using the acquired theoretical foundations and skills, to perform professional, innovative or research activities, to formulate and analytically describe information, problems and solutions in geomatics, to explain them and discuss them with arguments;

is able to work independently on his / her own improvement, show a scientific approach to problem solving, take responsibility and initiative, working individually, in a team or leading the work of other people, make decisions and find creative solutions in changing or uncertain working conditions;

is able to independently obtain, select and analyze information and use it, make decisions and solve problems, show that he / she understands professional ethics;

knows the technologies and methods for performing study tasks or work tasks;

is able to plan and organize work, use various methods, technologies, tools to perform tasks;

- is able to demonstrate comprehensive knowledge of facts, theories and regularities necessary for personal growth and development, civic participation, social integration and further education;

- is able to understand and demonstrate in detail a variety of specific facts, principles, processes and concepts in a particular field of study or professional activity in standard and non-standard situations;

- is able to manage geodetic and cartographic works; participates in the performance of specific works and may manage these works; - knows the certification procedures and requirements for surveyors and is able to take certification exams;

- is able to process geodetic data in accordance with the specified requirements;

- is able to use modern technologies to perform various tasks;

- is able to independently solve more topical problems in the fields of geodesy and cartography;

- is able to defend and substantiate the results of research work;

- is able to participate in national and international projects;

- ensure effective communication and liaison with industry.
http://ec.europa.eu/social/main.jspcatId=738&langId=en&pubId=7267&type=2&followPubs=yes

and http://ec.europa.eu/social/main.jspcatId=955&langId=en Various spatial data sets are increasingly being used for decision-making, process modeling, and other purposes. The study shows that there is a very noticeable gap between labor market demand and supply of specialists and institutions of higher education study programs.

An international experience developed throughout the studies open up good opportunities to apply the mastered knowledge and skills in Lithuania, Latvia and other EU member states and to be employed by multidisciplinary companies and organizations involved in the supply of consulting, planning and design services or different kinds of surveying or GIS applications. Graduates of common master programme would be specialists in demand at the State Land Service of Latvia. The State Land Service (hereinafter - “SLS”) is a governmental institution of the Republic of Latvia which was established in 1992 to implement land reform. SLS is in charge of real property object data accumulation and dissemination to institutions responsible for land management and supervision. Also graduates would be very welcome at the Latvian Geospatial Information Agency (LGIA), which is one of the leading institutions in the realizing of the national policy in the field of geodesy, cartography and geospatial information. Pursuant to the competence the LGIA cooperates with state and local authorities, with the NATO member states, with European Union institutions and competent international organizations, as well as provides to these organizations and to the public geodetic, cartographic and geospatial information. As well our graduates work at the Rural Support Service (RSS), which is state administration institution and operates under the supervision of the Ministry of Agriculture in accordance with the Law on Rural Support Service. The Rural

Support Service is responsible for implementation of a unified state and EU support policy in the sector of agriculture, forestry, fisheries and rural development; it supervises compliance of the sector with the laws and regulations and fulfils other functions connected with agriculture and implementation of rural support policy. Besides that our graduates work at Latvian State Forest service, Maritime Administration of Latvia, State Joint Stock Company Latvijas Gaisa Satiksme (LGS), which provides to the users optimum Air Navigation Services in Riga Flight Information region, etc.

Graduates of Innovative Solutions in Geomatics Master programme has the access to Doctoral (PhD) studies.

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

During the reporting period, **Academic Master Study Programme "Innovative Solutions in Geomatics"** was implemented in English on a full-time basis.

Number of students:

In the reporting period, 27 Master Theses have been defended and the Master's degree in geomatics was awarded to 27 students. Students from Latvia, Lithuania, Egypt, Nepal, Spain and Ukraine are enrolled of have already graduated form the study programme.

Analysing the total number of students in the reporting period, it should be concluded that in the first year of programme implementation - 2016/2017, there were 7 students, in the second year, in 2017/2018 there was a larger number of students - 13. In 2018/2019 8 more students joined the programme and in 2019/2020 - 6 more students. However, in 2020 it was not possible to organize a student group due to restricted mobility opportunities caused by the pandemic.

In 2016, all 7 students were form RTU, in 2017 - 6 students, inc. 4 RTU students. In 2018 - 8 students, inc. 6 from RTU, but in 2019 - 6 students, inc. 2 from RTU.

Some of the potential students have been affected by the global pandemic. Covid 19 has reduced job opportunities, reduced financial resources that could be channelled to education and mobility.

Number of graduates:

The programme has 27 graduates.

Expelled:

There are no expelled students, all have successfully completed the study programme.

Full-time students of the study programme are offered an opportunity to take part in the international student exchange project *Erasmus+*. All students on a competitive basis have been involved in the mobility.

3.1.5. Substantiation of the development of the joint study programme and description and evaluation of the choice of partner universities, including information on the

development and implementation of the joint study programme (if applicable).

Innovative Solutions in Geomatics second cycle (Master's degree) university joint study programme, the implementation of which is intended at the Faculty of Environmental Engineering (hereinafter – FEE) of Vilnius Gediminas Technical University (hereinafter – VGTU) and Riga Technical University (hereinafter – RTU). The main purpose of the joint program is to enable students to acquire more knowledge, skills and experience than one institution's study program can give. Aim of the programme - train measurement engineering specialists, with the up-to-date specialized knowledge in geomatics, geodesy and cartography, related to creation, development and improvement of geodetic networks; creation, development and improvement of geographic information systems; who are able to comprehend and analyse interaction of different kinds of knowledge, come up with problems and their solutions based on the scientific research in the field of measurement engineering, conducted on the basis of the acquired knowledge, optimise geodetic and cartographic data mining, by modelling the analysed processes in geoinformation systems; with developed abilities to apply innovative solutions for complex industrial activities, related to cognate areas and technological advancement, scientific analysis and research skills, necessary to maintain and improve the acquired professional competence in the ever-changing technological environment, scientific research institutions, doctoral studies. Through a joint degree program, each partner contributes to a study subjects which are best mastered in each of the partner institutions, for example VGTU has the equipment and experience in laser scanning and remote sensing, creating GIS databases, RTU staff have experience in researching gravity parameters of the Earth, satellite altimetry, GNSS and VLBI data processing and analysis. The programme focuses on analytic applied and research activities. The programme curriculum is designed to provide specialized up-to-date knowledge on geomatics, geodesy, cartography and geoinformation systems, which can be used to develop scientific research, develop critical understanding of the areas of geodesy and cartography and understanding of knowledge interaction from other related areas; develop specialized geodesy and cartography, geoinformation systems problem solving skills, necessary for conducting scientific research; develop new knowledge, methodologies and technologies by integrating knowledge from different areas; develop managerial and teamwork skills, applicable in learning and professional environments, the latter being complicated, unpredictable and requiring solving complex problems consisting of multiple interrelated factors and globalisation processes.

Innovative Solutions in Geomatics study programme was developed considering:

- the provisions of *National Sustainable Development Strategy* and provisions of *Strategy of Lithuanian Regional Policy* (especially "promote development of human resources" and "promote the focus of university higher education on demand of highly qualified specialists in the regional centres");

- The major documents of the development of the European higher education area (*"The Bologna process – The European higher education area in the new decade"* and *"A framework for qualifications of the European higher education area"*);

- Methodology for Assessing Implemented Study Programmes, Order of the Director of SKVC No. 1-01-162, issued on 20 December 2010;

- *UNESCO, OECD UNESCO, OECD Guidelines for Quality Provision in Cross-border Higher Education, 2005*;

- *EFMD Recommendations for Quality Assurance in Higher Education Business Schools, 2011* EQUIS – European Quality Improvement System, The EFMD accreditation for International Business

schools. www.efmd.org.

In March 17, 2014 an agreement was signed on a joint master's degree program execution between the VGTU and RTU. Expected results of the program of study to describe what graduates should know, understand and be able to / or be able to use the training of the long working life in accordance with their degree. Learning outcomes of the study programme are divided into five groups (1) knowledge, its application, (2) abilities to conduct research, (3) special abilities, (4) social abilities, (5) personal abilities. In Lithuania and Latvia, a steadily growing demand for professionals in the measurement engineering associated with intensive real estate and construction sectors growth, decreased in recent years and has stabilized. However, the emergence of new needs related to new innovative technologies in the field of measurement (laser scanning technology, remote sensing, unmanned aircraft data, digital spatial databases and their use and so on.). It can be concluded that the todays market needs more than traditional surveying specialists, a professional able to collect, process, analyze and present the large amounts of spatial information gathered using latest technologies. To produce graduates who are able to apply innovative technologies and geomatics techniques VGTU and RTU joint Master's Degree program was developed. It should be noted that the VGTU and the RTU is the only university level higher education institutions in Lithuania and Latvia, preparing measurement engineering professionals.

The intention is to carry out a joint study program “Innovative Solutions in Geomatics” reflects the European Union (EU) initiative for the creation of a spatial data infrastructure in each of the EU member countries. In 2007. March 14. European Parliament and Council Directive 2007/2/EC (OJ 2007 L 108, p. 1) establishing an Infrastructure for Spatial Information (INSPIRE) has to be implemented in Latvia and Lithuania http://inspire.ec.europa.eu/.

It is expected that the development of new construction technologies, as well as through international projects Lit Pol Link, Rail Baltica, Via Baltica, need for skilled professionals who are able to use innovate techniques further will increase. The older generations of practitioners are not always able to respond adequately to technological developments and changes in technology and adapt to current needs. Professionals need is researched in Daujotis V. et al. (2008) study " Professionals needs analysis in Lithuania". The total estimated trend – the demand of people with higher education will increase.

In view of the above discussed trends, it can be said that the need to develop a highly skilled engineering measurement specialists who are able to use innovative technologies, geospatial data and information technology is going to rise, and education and research institutions of international cooperation is particularly significant.

Main Department of Geodesy and Cartography of ongoing research areas are:

1. GIS technology and its application;
2. Geodetic measurements of theoretical and experimental research and applications.

Geodesy or surveying engineering education was a part of Riga Polytechnic Institute’s (from 1990 Riga Technical University) programme already in previous century. At that time, it was held within the Faculty of Civil Engineering in Construction Department of Roads, Bridges and Aerodromes, but later in Department of Roads, Bridges and Geodesy, Department of Roads and Bridges, Department of Transportation Structure. From 1991 Department of Geodesy up to 2003 and from 2003 up to now it is called as Department of Geomatics within Faculty of Civil Engineering.

It has to be emphasized, that Geodesy/geomatics engineering higher education system in Latvia after winning of independency was reformed. Instead of continental study scheme was introduced anglo-saxon study system, i.e., were introduced academic bachelor and academic master study programs with nominal study length 3 years and 2 years respectively. However, after 3 yearlong

bachelor studies graduates were not ready to enter labor market. In 2003 we have introduced bachelor and master professional studies in Geomatics engineering. The Department of Geomatics Civil Engineering Faculty of RTU is the sole department in Latvia to provide two cycle Geomatics Engineering specialists.

The main directions of scientific researches pursued by the Department of Geomatics are the following:

1. Cadastral, topographical surveying and land management systems;
2. Geographic information systems and open source software;
3. Geodetic networks adjustment and with use of GNSS, evaluation;
4. Research on earth gravity field, geoid modelling and earth tides;
5. Deformation monitoring of historical buildings.

Research activities of Geomatics department personnel have a positive influence on implementation of the academic programme. First of all, it gives an opportunity for students to participate in different projects as well as to familiarize themselves with a modern equipment, software and testing knowledge on fieldworks. The analysis of specialist training environment showed that „Innovative Solutions in Geomatics" degree program is unique; there is no such program in other Lithuanian and Latvian universities. Exchange visits of stuff and students to other universities gives he positive impact for the study program These exchange visits allows to compare studies in different schools, while improving the realization of program execution quality. Students have the opportunity to study at one of the VGTU or RTU partner universities through Erasmus exchange program. Joint degree master study program "Innovative Solutions in Geomatics" will be carried out in Lithuania, Vilnius Gediminas Technical University and in Latvia, Riga Technical University. Joint degree master study program "Innovative Solutions in Geomatics" includes 90 (ECTS) credits. Studies will be held in semesters.

The study program is implemented between two universities.			
	1. semester	2. semester	3. semester
RTU	X		
VGTU		X	
RTU or VGTU at the choice of the student			X

Under the Partnership Agreement for the first semester, students will study in RTU second semester classes will be held in Vilnius Gediminas Technical University. One-semester covers - 30 ECTS credits. Postgraduate studies are completed by master's thesis, which comprises 30 ECTS credits. One ECTS credit is equal to 26.67 contractual working hours. Master's thesis public defence will take place in VGTU or RTU with participation of postgraduate theses supervisors.

The study programme and its update is under the supervision of the Programme Committee, which acts in accordance with the VGTU Study Programme Committee Provisions, approved by the Resolution No. 62-2.2. of 19 February, 2013. Study Programme Committee is subordinate and

accountable to the Dean of the Faculty and the Faculty Study Committee. Apart from the Department of Geodesy and Cadastre, other departments of the university also participate in the implementation of the programme. The departments cooperate systematically with the Department of Geodesy and Cadastre to implement this programme: the study modules, including their contents and scope, submitted by these departments are considered; and the comments regarding the studies quality improvement made by the teachers of these departments are considered.

**VGTU changed the abbreviations to VILNIUS TECH from 2020 y.*

3.2. The Content of Studies and Implementation Thereof

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

The academic master's study program "Innovative Solutions in Geomatics" corresponds to the trends in the acquisition and application of geospatial information in the EU countries and in the world. In the process of its improvement, changes based on technical innovations in Latvia and throughout Europe have been studied in recent years. The Department of Geomatics of the Institute of Transport Structures of the Riga Technical University (RTU), Faculty of Civil Engineering (BIF) has close cooperation with public associations - the Latvian Surveyors Association (LMB), the Latvian Association of Cartographers and Geodesists (LGGA). active members of the Geophysical Association (IUGG), the International Surveyors 'Association (FIG) and the International European Surveyors' Association (CLGE), and the Latvian GIS Association (LATGIS), which is a member of the European Geographic Information Umbrella Organization (EUROGI). The Department of Geomatics of the RTU BIF Institute of Transport Structures has been an academic member of the International Surveyors' Association (FIG) since 1999.

A person working in the field of geomatics - geodesy, cartography and land management - must be competent in all complex issues related to all types of surveying, processing, analysis and interpretation of geospatial data, in accordance with the initially given or defined task. The study program is an open-ended program that takes into account the goals and objectives of higher education, as well as regional and national interests related to the needs of students and employers. Each lecturer involved in the program has a sufficient and up-to-date number of scientific publications on the topic of the course.

2014/2015 During the study year, work was done on the development of the content of the study program in accordance with modern requirements and the best possibilities of Vilnius Gediminas Technical University (VGTU). In accordance with the wording of the state standard and the decision “On Uniform Requirements for Study Programs of Riga Technical University” adopted at the RTU Senate sitting on March 23, 2015, the study program was developed in the initial structure. Each

study year has 2 semesters, the duration of each semester is 20 weeks - 16 study weeks and a 4-week session. Riga Technical University is a state-founded derived public entity with autonomous self-government rights. Its development strategy defines the role of the university as an institution of higher education and science in society, its mission, vision, goals and objectives. In developing RTU's development strategy, recognizing the role of the university in the growth of the Baltic Sea region and shaping the future of Latvia, the priorities of the European Union, as well as the guidelines of national and regional level education and innovation policy planning documents have been observed.

The program complies with the Strategy and Development Program of Riga Technical University 2021-2025. in the National Development Plan 2021-2027. implementation of the guiding principles for. RTU positions itself as one of the cornerstones of Latvia's development, which ensures the training of specialists necessary for the Latvian economy, as well as the creation of new products and services, serving as a basis for Latvia's sustainable growth. The RTU Strategy includes the most important settings for the development of RTU in the period until 2025, as well as determines the division of activities and responsibilities for the performance of tasks. In order to implement RTU's vision to become the leading university of science and innovation in the Baltic States by 2025, the strategy defines three goals of the university - a high-quality study process, excellent research, as well as sustainable innovation and commercialization activities. Specific performance indicators have been defined for these purposes.

The study process is organized in such a way that the topics of students' studies and research work include modern, topical issues. In September 2017, an exciting guest lecture "Near-field spacecraft VLBI tracking in the context of space geodesy" was given to all students by Professor Leonid Gurvits from Delf University of Technology (Netherlands). In November 2019, the RTU Department of Geomatics organized a seminar-discussion “2D-3D-4D GIS”, which took place within the framework of the International GIS Day. Not only students and lecturers, but also other interested people could take part in it. The speakers of the seminar were representatives of well-known GIS companies in Latvia and the world, who talked about the possibilities of different dimensions in the GIS environment and their contribution to different industries, but in the discussion part, on the capabilities and development of GIS. On May 24, 2019, an erudition competition was organized for the students of the study program "Geomatics Matches". The aim of the competition is to give students the opportunity to show their knowledge, skills and ingenuity by competing with each other. Also to strengthen knowledge, understanding and confidence in the application of geomatics knowledge. And to develop teamwork, friendly competition between course students and cooperation with faculty. The erudition competition includes theoretical and practical tasks in the field of geomatics, covering mathematics, astronomy, cartography, geophysics, geodesy, surveying, remote sensing, GIS, photogrammetry, and general questions about the field of geomatics, which will be related to the history of the field. Also in November 2020, within the framework of the International GIS Day, a seminar-discussion was organized at the RTU Department of Geomatics, this time in a remote manner, which was dedicated to the academic and professional development of GIS in Latvia. The aim of the event was to educate both students and other students in the field of geomatics about how geographic information systems have entered our society, how long Latvian specialists have been working with them, how much they have achieved and what opportunities they see in the future. This time, in the part of the seminar, representatives of several Latvian universities were invited to tell about the growth during these years, since GIS has entered Latvia, what projects are being carried out and what new peaks they want to achieve in this field. Meanwhile, in the discussion part with the university and the LMB representative, the role of GIS for geomatics specialists was discussed, how important it is, what it gives and why it would be necessary to learn it at all.

Annual assoc. During the study tours organized by Professor J. Kaminska to the Institute of Astronomy in the Botanical Garden in Riga, students have the opportunity to get acquainted with the brightest scientific pioneer in laser technology (SLR) and time measurement in Latvia and the world. There is also the exact point or benchmark of national gravity of national significance. Students regularly present their research papers at student scientific and technical conferences. 2015/2016 During the study year, students participated in the 57th RTU Student Scientific and Technical Conference, presenting the results of their research in the development of Geomatics. 2016/2017 During the study year, the students of the program participated in the 58th RTU Student Scientific and Technical Conference with reports related to the chosen field of study. The scientific head of the section was Dr. sc. ing., assoc. prof. Jānis Kaminskis and the scientific commission consisted of: Dr. sc. ing., assoc. prof. Maris Kalinka, Dr. sc. ing., assoc. prof. Jānis Zvirgzds, Dr. oec., assoc. prof. Armands Auzins, Dr. sc. ing., prof. Eimuntas Paršeliunas, Dr. ing., doc. Jūratė Sužiedelytė Visockiene. Also 2017/2018. During the study year, the tradition was continued when the students of the program participate in the RTU Student Scientific and Technical Conference - RTU 59th Student Scientific and Technical Conference with reports related to the chosen field of study and the study courses included therein.

The masters had 12 reports on topics relevant to the field. A couple of students of the study program regularly receive awards for the best reports. This tradition continues regularly in each academic year. 2020/2021 During the study year, students participate in the RTU Student Scientific and Technical Conference, which is taking place for the 62nd time. The mission of the Master's study program is to provide the Latvian and Lithuanian economy and society with internationally competitive high-quality scientific research, higher education, technology and innovation transfer, and to prepare high-quality specialists in the field of geomatics in demand and competitive in the international labor market. The general goal of the Master's academic study program "Innovative Solutions in Geomatics" is to provide a set of theoretical knowledge and practical skills for students to achieve a broadly internationally recognized competence corresponding to the Master's degree.

The goal of the program is:

• to provide students with a broad, academically oriented education that enables them to easily adapt to the labor market, as well as to carry out scientific research work;

• to provide students with appropriate theoretical and practical training, which gives an opportunity to continue their education in doctoral studies;

• to create an opportunity for students to obtain a qualification closely related to their future work, to provide opportunities for the acquisition of theoretical knowledge and skills that would allow graduates to start academic or professional activities after mastering the program; • to ensure the acquisition of modern general knowledge, to develop economic and professional thinking, to promote students' analytical abilities, to develop skills in solving various tasks, to develop projects that would allow graduates to get involved in solving theoretical or practical problems;

• to develop the ability to work in a team and work with specialists in various fields, to provide an opportunity to develop knowledge of foreign languages, which would ensure the ability to cooperate with colleagues from other countries.

The content and scope of examinations correspond to the content and skills and knowledge requirements specified in the study course programs. All conditions for obtaining credit points are described in the program of each course. The Master's academic study program is implemented in lectures and classes, in measurements - in previously prepared field landfills or in specially equipped geodetic measurement classrooms, as well as in independent studies, learning the basics of geodesy and cartography and its connection and innovations with other relevant economic

spheres. All study courses included in the study program are related to the goals and tasks of the study program, as well as to the results to be achieved. When acquiring study courses, students must acquire knowledge, skills and competencies determined by professional standards. Analyzing the connection of the goals of the study program, the results to be achieved with the information included in the study courses, the results to be achieved, the set goals and other indicators, it can be concluded that:

• The strategic goal of the study program is developed in such a way as to provide education based on the theoretical foundations of the field of economics, culture, national defense and security, as well as social needs.

General tasks of the study program: - to provide competitive master's higher education in accordance with international standards and to prepare students for practical work, to develop skills of scientific research work and to promote their use; - to provide students with comprehensive knowledge in the field of geomatics, to develop specialist skills and develop competencies in accordance with the requirements of the labor market; - to promote interest in further education and development, supplementation of academic and professional knowledge; - to stimulate students' interest in the processes taking place in society, to stimulate the development of students into a positive, modern, responsible and capable personality who is able to act independently and make decisions independently; - to ensure the development of the content of the study program, the study process, scientific research work and changes in accordance with the latest technologies and findings in the fields of geomatics, geodesy, international practice, science and didactic practice; - to promote the interaction of the academic staff and students in the performance of scientific research work and in the practical application of the obtained results in accordance with the international standards and tendencies in the geomatics sub-sector of the construction industry; - to promote and develop the international exchange and participation of academic staff and students in projects. Measurements of the results of the tasks are student study results, graduate employment rates and feedback from employers, expansion of international cooperation, increase in the number of research projects and increase in the number of students involved in the research process, as well as approbation of research results in companies, etc.

The study system is designed in accordance with the Law on Education and the Law on Higher Education Institutions so that it maximally promotes the achievement of the goals set in the study programs and facilitates the fulfillment of tasks. The study system at the university is internally regulated by the documents regulating the relationship between students and the university and the course of studies, and the documents regulating the organization, which are available at the program administration and virtually on the RTU website. Volume of the program - the volume of the study program and its structural distribution is in accordance with the state education standard. The amount of the program and study courses is expressed in credit points. Structure of the study program:

1. Compulsory study courses 28 CP

2. Compulsory elective courses 12 CP 3. There are no free choice courses

4. Practice is not

5. Master's thesis 20 CP

A total of 60 CP.

In addition, if not acquired in previous studies: Civil protection - 1CP

Basics of labor protection - 1 CP Basics of Environmental Engineering - 2 CP

At the beginning of the studies, students receive a short informative material, which contains the most important information for the student about the organization of studies and practical implementation. In order to ensure the achievement of the goals and tasks set for the program, compulsory study courses, general education study courses and common study courses are acquired in the first and second study semesters, which form the basis for the acquisition of special knowledge and practical skills during further studies.

The nominal duration of studies in full-time studies is 1 year 6 months. The total amount of the study program is 60 CP. The study content is reflected in the program of each study course. The content of the study program course program is reviewed once a year to update the study course content, taking into account the changes in the field and daily necessities, which are also provided by the study program of each study course. In order to ensure the interaction of knowledge, competencies and skills acquired by graduates, special emphasis is placed on the development and implementation of study courses:

• to reflect current problem situations in the content of the study program (at the level of lectures, practical work), incl. analysis of the real situation of the study program and provision of solutions within the content framework of the specific course;

• use of modern teaching methods (solutions of specialized data programs, use of unified solution algorithm, solution-oriented methods, programming, etc.);

• the integrity of the study course and the study program, i.e. developing an inter-course learning approach;

• for the improvement of study methods in cooperation with foreign experts (for example, Vilnius Gediminas Technical University) for a distance learning form, using the e-learning environment ORTUS of Riga Technical University (RTU).

Individual access for students is provided:

• study materials are provided in the form of both handouts and electronic materials and presentations;

• if necessary, the lecturer plans individual meetings and consultations with the student, because each lecturer has a consultation schedule, which students are introduced to in the first lecture, in the RTU ORTUS system, lecturers must indicate possible consultation times and for the respective times, as well as consultation times are available at geomatika.rtu.lv;

• the individual approach is observed in the choice of applied teaching methods, analysis of individual topics and problems during lectures, practical work, laboratory work and seminars;

• when choosing the topic of the master's thesis, the student's wishes and the specifics of the work in the chosen specialization are taken into account;

• Intensive and regular electronic communication takes place both in the electronic mail, in the ORTUS environment and on the website.

During the implementation of the program, mutual feedback is regularly provided. Students receive regular feedback from the lecturers on the submitted tests, course, exam, study projects, reports, practice reports and presentations. In the middle and at the end of the study course, the teaching staff conducts a survey on students' satisfaction with the content of the course, their wishes, as well as listens to proposals, incl. teachers include their individual questions in the surveys.

The state language study course isn't implemented, because the duration of studies in Latvia doesn't exceed six months.

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

Academic Master Study Programme "Innovative Solutions in Geomatics" Academic staff is actively involved in scientific research both in Latvia and internationally. For example, during the reporting period the following projects have been or are still being implemented:

- "Coast for us" (Coast4us): CB627. Interreg Central Baltic Programme 2014-2020. 01.01.2018–30.09.2020. http://buni.rtu.lv/projects/interreg-cb-coast4us/?lang=en;
- Nordplus project 2020-2022 Geodetic education build-up, No. NPHE-2020/10401.

Teachers and researchers from different countries and universities, with different cultures, representing different disciplines and disciplines, had the opportunity to share their knowledge, experience, learn and teach, develop existing skills in their field, and work together. The main objective of the event was to improve education and research in the field of sustainable development by providing concrete recommendations, suggestions and solutions. The information obtained was rich in examples of how to improve education for sustainable development, based on the unique experience of different countries, their study disciplines and research areas.

Assoc. prof. A. Auziņš participated in the work of the jury commission of the competition "Real Estate Agent 2017" organized by LANIDA.

Assoc. Prof. Māris Kaļinka together with the students of the study program and the BIF student self-government in Mārupe Primary School organized the competition "Paper Bridges".

Students of the study program Assoc.Prof. Under the leadership of Māra Kalinka, the geodetic works of Riga Dome Monitoring are regularly developed.

In cooperation with the Latvian Geospatial Information Agency and researchers of the Finnish Geodetic Institute (FGI), the students of the study program Assoc.Prof. Gravimetric research in Latvia is carried out under the guidance of Jānis Kaminsks.

In collaboration with researchers from several faculties of Riga Technical University (RTU) and students of the study program, a new property management system has been developed, which is experimentally intended for use at RTU. The scanning of the buildings is carried out under the supervision of specialists from the Department of Geomatics of the RTU Faculty of Civil Engineering (BIF). RTU buildings are documented in 3D by specialists and students of the RTU BIF Department of Geomatics.

Within the framework of the implemented study courses, information on news and the latest technologies is integrated, study tours to scientific objects have taken place, news about technologies are integrated into the study courses.

Students have the opportunity to participate in the presentations of the contest applicants and get information about the news.

The results of the research are published not only in the publications in the internationally recognized databases, but also in the RTU BIF magazine "Construction", where it is possible to publish for both teachers and students.

The research results of academic staff are not only summarised in scientific journals indexed in international and science-relevant databases, but also monographs have been issued such as:

1. Auziņš, Armands. Evaluation and Management of Land Use: scientific monograph/ Armands Auziņš; reviewers: Velta Paršova, Marija Burinskiene, Siim Maasikamäe; [scientific editor Ineta Geipele; responsible publisher Anita Vēciņa; editor Inga Skuja]; Riga technical University. Faculty of Engineering Economics and Management. Institute of Civil Engineering and Real Estate Economics. Riga: RTU Publishing House, 2016. 270 pp. http://dx.doi.org/10.7250/9789934107801
2. Auziņš, Armands. Evaluation methodology of land use efficiency in land management: Summary of the Doctoral Thesis / Armands Auziņš; scientific supervisor Jānis Vanags; Riga Technical University. Faculty of Engineering Economics and Management. Institute of the Civil Engineering and Real Estate Economics. Department of the Civil Construction and Real Estate Economics and Management. Riga: RTU Press, 2013. 51 p.

Textbooks are also issued, for example, a textbook by Prof. Juris Žagars, Assoc. Prof. Jānis Zvirgzds and Jānis Kaminskis "Global Navigation Satellite Systems / GNSS", issued in 2014, 232 p. ISBN 9789984648538.

The presented examples attest that the research findings are integrated in the study process within each study course.

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

Within the **Academic Master Study Programme "Innovative Solutions in Geomatics",** democracy and a dialogue with students are one of the core principles of the study programmes of the Faculty of Civil Engineering of Riga Technical University, as well as students are actively involved in the study process improvement. Students can take part in improvement of the study process directly – by expressing their wishes to the instructor of the specific study course, heads of departments, head of the study programme or with the help of representatives of Student Self-Government who are members of the Council of the Faculty of Civil Engineering, RTU Senate and RTU Senate commissions, as well as RTU Academic Assembly.

The study programme administration considers that relations of the Faculty of Civil Engineering with students are characterised by mutual trust, cooperation, respect and honesty that promote understanding, correct perception and ability to use knowledge in practice.

To ensure the principle of democracy, the work of professors, assistant professors, lecturers and guest lecturers is evaluated by students at least once a semester by replying anonymously in the ORTUS environment to questions of the survey. In the ORTUS environment, RTU Study Department conducts surveys of the portal users and different questionnaires regularly, including assessment of the academic staff work at least twice during a study year. Students can thus provide feedback on

the quality of the study courses and the professional performance of the academic staff. Questionnaires include questions on the availability of study materials for a particular course, instructor evaluation criteria, culture and quality of work, observation of rights of students during the course, the time spent on the student's own work and the study discipline. The final part of the questionnaire is intended for student proposals and initiatives to improve the quality of the study course and the instructor's work. The questionnaires are completed anonymously so that the responses provided are not likely to affect attitudes of an instructor towards a given student or a group of students and the goal of obtaining an objective assessment of students is reached. Still, it has to be acknowledged that not all students use this opportunity. In order to ensure a link among students, academic staff and the programme administration, the Student Self-Government of the Faculty of Civil Engineering, which actively participates in all these processes and carries out the annual evaluation of academic staff, plays an important role. The annual Pride Award of the Faculty of Civil Engineering has been created to honour the best academic staff, which is a student event to assess the work of the academic staff. The didactic concept of the study programme is based on the use of the latest and most advanced teaching methods. It provides for the development of the content of studies and a study organisation which ensures the sequential and in-depth acquisition of the knowledge provided for in the study programme and aims to address real practical examples and challenges, and an in-depth study of theoretical and practical issues in the field of geodesy and cartography. This includes knowledge acquisition stimulating methods, interactive cooperation among students, instructors and internship supervisors, as well as free debates in a multicultural environment. The programme uses training methods such as group work, situation analysis, seminars, discussions, field trips to industry companies and facilities to learn and consolidate the study material in an appropriate working environment, lecturing through PowerPoint or other presentations. In addition to the theoretical courses in the university premises, learning trips to industry enterprises and organisations in Latvia are organised. Learning trips are organised both to promote in-depth acquisition of a theme within a definite study course and as thematic trips. Field trips and study visits ensure that the content of the study programme is linked to the specific nature of the sector, students acquire not only theoretical knowledge but are able to link it to daily situations in industry companies, analyse problems and reason their views.

The programme uses the Ortus interactive e-learning environment of RTU based on the Moodle platform, which is regularly used by students, academic staff and guest lecturers of the study programme. In the Ortus portal, the student has access to all up-to-date information in the course of the study process. It contains current study courses (annotations, requirements for successful completion of the study course, plan of lectures, lecture and practice materials, required references, etc.), information on students' achievements and completed study courses, current reports, library information, access to teaching and scientific literature and databases, e-mail, etc. In the e-learning environment, academic staff places different tests and tasks for self-control of the student's knowledge, as well as the system allows for the creation of different interim tests and credit tests. Within the Ortus framework, it is possible to communicate with the academic staff members, and also with groupmates as part of current courses. The portal has discussion forums, regular surveys on the content, quality and academic staff of study courses, presentations, and other audio, video and technical aids. In order to ensure achievement of the learning outcomes in the study process, students are presented the aims, tasks and learning outcomes to be achieved, as well as the assessment requirements, both at the beginning of the first and second study year. Students know in good time the criteria for evaluating examinations, tests and other works in accordance with RTU Study Regulations. All requirements for obtaining credit points are described in the program of each course.

The following fundamental assessment principles of education are taken into account during evaluation:

1. the principle of summing up positive achievements;
2. the principle of mandatory evaluation;
3. the principle of openness and clarity of evaluation criteria;
4. the principle of diversity of evaluation types used;
5. the principle of availability of evaluation.

The quality of the education to be obtained is monitored by using surveys of graduates, employers and students of the academic Master study programme “Innovative Solutions in Geomatics”, results of examinations and tests, assessment of study papers and projects, internship reports and Master Theses.

The main evaluation platforms of mastering the programme are examination and credit test to be passed at the end of each study course. The examination form is set in the study programme.

The assessment of learning outcomes is performed in accordance with Regulation on the Assessment of Learning Outcomes ((https://www.rtu.lv/writable/public_files/RTU_1_studiju_rezultatu_vertesanas_nolikums.pdf)in Latvian) and Regulation on Final Examinations at Riga Technical University Teaching methods, structure of study courses and evaluation methods are selected by the academic staff responsible for the study course, according to the specific nature of the course and programme, as well as the needs of students. Training courses and seminars on the latest teaching and pedagogical methods are organised for academic staff, as well as they are promoted to attend qualification upgrade courses, both at internal events of the Faculty and at RTU level, nationally and internationally. RTU Academic Excellence Centre organises activities for the professional development of academic staff at the university level. Academic staff informs students about the specific assessment criteria of each study course at the first lecture, as well as they are published on the course page in ORTUS e-learning environment.

Master Thesis comprises a practical research in geodesy, cartography or land management with a part of the project in the relevant specialisation, in which a specific project is carried out with all the necessary practical measurements and calculations, linking as far as possible to the place of the student’s internship.

Students are able to demonstrate basic and specialised knowledge of professional activity and critical understanding of that knowledge when developing their Master Thesis, with a share of knowledge corresponding to the highest level of achievement of the field or the latest scientific knowledge.

Master Thesis is publicly defended for the evaluation of which the State Examination Commission is appointed by the RTU Rector, consisting of a broad representation of future employers and representatives of other universities. Master Theses are evaluated by reviewers approved by the Dean of the Faculty of Civil Engineering.

The principles of student-centred education are also taken into account in the implementation of the study process.

1. Student involvement in the study process and its development

RTU has developed procedures that offer students the opportunity to provide feedback on the quality of the study process (surveys, regular meetings with the programme director, etc.) Therefore, students have an opportunity to influence their study process. Students under the programme are regularly involved in evaluating the quality of study programmes, participating in decision-making bodies and advisory bodies, and are also involved in writing a self-assessment report.

2. Learning outcomes

The evaluations of study courses and the number of credit points of the programme relate to the learning outcomes and students are informed about these. Academic staff associate the learning outcomes of the course with that of the study programme and reason the need for mastering the information of this course for mastering the respective profession.

Exam and test are the main forms of assessment within the study programme, which shall be passed at the end of each study course. The exact mode is specified in the description of the description study course. Assessment of learning outcomes is performed in accordance with the Regulation on the Criteria for Evaluation of Learning Outcomes

((https://www.rtu.lv/writable/public_files/RTU_1_studiju_rezultatu_vertesanas_nolikums.pdf)in Latvian) and the Regulation on the Final Examination at Riga Technical University.

3. Mobility

Mobility resources are used in the study programme to improve the pedagogical process of higher education, as the student-centred educational approach is based on a strong pedagogical process. Foreign university academic staff are involved in the implementation of the study programme, for example, a 2-hour guest lecture on “Geodetic Works and Coordination Base: Latvia and Lithuania”, led by Eimuntas Paršeliunas from Vilnius Gedeminas Technical University, Lithuania, has been conducted in the framework of the study course “Fundamentals of Geomatics”. Thus, not only students, but also the academic staff involved in the implementation of the programme take advantage of the good practices that can be shared by guest lecturers.

4. Social dimension

The study process is flexible enough to connect work/family life with studies. This is demonstrated by the graduate survey results, which indicate that nearly 95% of students already work during studies. It is a positive point to mention that the premises of RTU Library are available to students 24 h and also on holidays.

5. Teaching and learning methods

Different teaching and learning methods are used in the implementation of the programme. For example, study projects are being developed, group works and seminars are taking place, and some study courses use a method that allows students to assess and learn from each other. There are also regular field trips and guest lectures. Students are invited and participate in international professional competitions, such as International GIS Days organised at higher education institutions of Kaunas, Lithuania. Students have the opportunity to receive individual tutorials with academic staff, including e-learning environment communication, Zoom, WhatsApp, etc.

6. Learning environment

Cooperation between librarians and academic staff is underway in the course of the programme with a view to improving the teaching and learning process. Students are presented with the resources and databases available in the library. Similarly, both academic staff involved in the programme and students are provided with access to research and learning in suitable premises with adequate equipment. Both students and academic staff may use department laboratories with different databases for the process of developing their research papers.

7. Academic personnel competence development

The academic staff involved in the programme is provided with regular opportunities for the development of their methodological and didactic skills. Teaching methods, structure of study

courses and evaluation methods are selected by the academic staff responsible for the study course, according to the specific nature of the course and programme, as well as the needs of students. Training courses and seminars on the latest teaching and pedagogical methods are organised for academic staff, as well as they are promoted to attend qualification upgrade courses at internal events of the Faculty, at RTU level and internationally. RTU Academic Excellence Centre organises activities for the professional development of academic staff at the university level. The development of competences for academic staff also includes discussions on the use of teaching and learning methods, including innovative teaching methods. Within the framework of international ERASMUS+ projects and Nordplus projects, academic staff are involved in the development of new study courses, share experience in the use of study methods, materials and programmes with representatives of different European universities.

8. Extra-curricular student activities

The programme administration supports activities of the Student Self-government and encourages students to engage in it, thereby allowing students to develop their own self-consistency by providing students with an opportunity to implement their ideas, as well as opportunities for additional learning outside lectures. Students' desire to develop their ideas in project competitions, business incubators, use the RTU Design Factory capabilities for prototype development and many other options are also supported. All students of the programme are offered opportunities to engage in extra-curricular activities (Self-government, dance collective, choirs, debate associations, theatre studio, etc.). All this points to the active extra-curricular life of students and the opportunities for such activities for students.

Students in the geomatic industry have a variety of erudition contests, such as "Are You the Surveyor No.1?" and "Geomatic Competition", which help students find out different aspects of the geomatic industry by interacting in friendly competition. The events take place on the scale of the Department of Geomatics, where it is possible to engage in the event in various mixed teams, as well as cross-university events are organised that allow students to meet other representatives of the field of geomatics in Latvia. At the same time, it also helps students become aware of the skills acquired during their studies, seeing their strengths and weaknesses, which are then developed by students in the learning process. It is noted that sometimes such measures contribute to students' desire to explore the study matter more profoundly. For example, in the process of arranging the competition "Are You the Surveyor No.1?", RTU teams asked the lecturer to help them preparing for the competition, in addition to practicing the various disciplines of competition erudition and practicality, which resulted in the unbeatable victory of RTU teams over several years and the enhanced convergence of courses, which in turn contributed to a better understanding of their further study process by students and internship at companies. As far as possible, activities also attract industry companies that motivate students with different awards and opportunities to operate in their businesses in the future.

Students of the study programme are also involved in scientific work and research on topical issues in the sector, participating in both local and international conferences. Student Scientific and Technical Conferences are organised in the spring semester.

Students can also participate in the annual International Scientific Conference of RTU. Research results are summarised after each part of the conference and a collection of theses is published.

The Council of European Geodetic Surveyors (CLGE) has been hosting an annual student contest for eight years. For several years now, students of the Department of Geomatics have been taking part in this contest, demonstrating that they are competitive and having received CLGE awards in various nominations for three consecutive years. In 2019, it was reported that Latvian students were the most active among all European Member States and most thesis were submitted exactly

from Latvia, half of which were from RTU students. In 2020, the European GNSS Agency (GSA) also became co-authors of this contest. The cooperation has lasted for several years and, as the GSA's role in the contest has increased, GSA and CLGE have become partners, sharing the idea of organising this contest jointly in the future. Hence, the format has also changed for the student contest, and two directions of the contest have been created – "CLGE Students' Contest on the Move" and "Geomatics on the Move Prize 2020". With the change of the format, the participation requirements have also increased, but it has not prevented representatives of the Department of Geomatics from participating and also this time one student has been nominated for the finals.

Every year, there is a student contest of the State Land Service and the Latvian Association of Surveyors organised, for which Master Theses of young graduates are nominated. Students of the Department of Geomatics are also nominated for this contest, having received recognition for effective, innovative and industry-relevant research, described and addressed in the framework of the Master Theses. Student-centred education provides for active participation of students in the study process, using a variety of teaching methods (discussion, practical tasks), which in turn promote equality between students and academic staff. This process is implemented by academic staff in their study courses, such as Assoc. Prof. M. Kaļinka and lecturer U. Krutova in their study courses related to geodesic measurements, calculations, software and cartography, geographic information systems organise seminars, where each student presents their theme, acting as a lecturer. Other members of the academic staff actively use group work at their practical classes, facilitating understanding of teamwork and common responsibility for the results of their work.

The results of the assessment of students' knowledge are discussed twice during the course of studies at the meetings of the Department of Geomatics, they are summarised, evaluated by the programme administration and serve as a basis for further development of the learning process. The results are also discussed at the meetings of the Council of the Faculty of Civil Engineering.

The learning outcomes of the students tend to be different. Full-time students have a very wide range of average grades for their first year of study. This is due to the different levels of previous knowledge among students. Analysing the issue, it must be concluded that, compared to previous years, the learning outcomes have increased and attitudes of students to learning have improved. Certainly, it is also the result of changes in the working style of academic staff, as well as the use of innovative approaches included in courses of study programmes, by organising the study process in a cooperative manner, in cooperation with the industry leading professionals and staff of the study programme.

It must be concluded that, compared to previous years, awareness of students and attitudes towards learning more effectively through the use of newer innovative dual approaches to study courses have increased. The first year is based on general education and field-specific study courses. In the next years of study, the situation regarding the learning outcomes continues to improve in terms of success, which is also reflected in the following indicators. RTU has the Alumni Golden Fund that includes the most prominent and capable RTU graduates, assessing them both by academic achievements and by public activities. Since 2017/2018 academic year, students of the study programme have also been included in the Golden Fund. During the last six years, 4 graduates of the Master study programme were included in the Golden Fund. In academic year 2017/2018, 1 programme graduate was included, in 2018/2019, one more programme graduate was included in the Golden Fund. In 2019/2020, 2 programme graduates were included in the Golden Fund, both students come from VGTU.

3.2.4. If the study programme envisages an internship, describe the internship

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

There is no fieldwork envisioned within the academic Master study programme.

The criterion does not apply to the academic study programme.

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

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

Students acquire research skills by working regularly with references and Internet resources to successfully develop different study papers, internship reports and the Master Thesis. This promotes research by students, working with international scientific databases, international standards (ISO) available at the RTU library with an electronic approach from the ORTUS environment.

Upon public presentation of each Master Thesis, the State Examination Commission provides a report on the quality of the developed Master Thesis, its topicality and the average assessment of the student. During public presentation of the Master Thesis, the Minutes are taken, where the main questions and the obtained assessment are reflected. The themes of the students' graduation papers are topical, comply with the programme aims, ensure the learning outcomes and are in conformity with the needs of the field of geomatics, geodesy, cartography and land management, innovations and science tendencies.

Before public presentation of the Master Thesis, it is reviewed by reviewers approved by the Heads of the Departments at both Universities (RTU and VGTU). The Master Thesis is publicly presented in an open meeting; it is assessed by the State Examination Committee approved by RTU and VGTU Rector's Order. The Committee consists of leading professors and researchers of the industry. The public presentation of the Master Theses takes place in succession at RTU or VGTU.

Examples of recent Master Thesis topics:

- Traffic Safety Analysis Based on Geospatial Classification of Streets

- Analysis of Possibilities of Satellite Imagery and Remote Sensing Data Processing with Geographic

Information Systems

- Use of Drones in Surveying

- Application of Virtual Reality in Geomatics

- Earth Magnetic Field Parameters Research Methods and Areas of Application

- The Concept of Creating an Open Space to Ensure the Safety of Drones

All Master Theses are available at https://ndr.rtu.lv/lv/.

Analysing a wide range of themes, it can be concluded that both the faculty and the students demonstrate their skills, knowledge, and competencies at a very high level and relevant to the sector. The selection of themes is based on the students' interest in the sector and on their expectations of future career choice, as well as the themes of the graduate papers demonstrate the sustainability and development of the study programme as a whole.

The analysis shows that the themes of the Master Thesis mentioned above are closely linked to topical issues in geomatics (geodesy, cartography, and land management), which are in constant development, mainly through new technical opportunities and offers.

3.3. Resources and Provision of the Study Programme

3.3.1. Assessment of the compliance of the resources and provision (study provision, scientific support (if applicable), informative provision (including libraries), material and technical provision, and financial provision) with the conditions for the implementation of the study programme and the learning outcomes to be achieved by providing the respective examples.

The study process is fully provided with latest educational materials, which students receive from RTU Central Library or the textbook subscription and can use during the entire period of studies. RTU students and academic staff have a wide and modern RTU Scientific Library available (in Ķīpsala, at Paula Valdena Street 5), where it is possible to use all kinds of educational materials, electronic subscription databases and temporary test databases. Working hours of the Library reading room for RTU students is 24/7, as the reading room of RTU Scientific Library is the place, where students can learn also late at night, beyond the working hours of the Library or the faculties. To intensify the study process, students are provided a continuous access to the RTU unified study support system "ORTUS". Currently, ORTUS provides students with:

- uploading of lecture materials and presentations;
- automatic uploading of video recordings of the lectures;
- regulatory enactments for study processes and amendments thereto;
- remote authorisation of students for commercial electronic information means (databases);
- electronic processing of tests and home assignments;
- information on learning outcomes of a student; information on a student's financial position, with an opportunity to prepare invoices in electronic form;
- online registration/cancellation of registration for the next semester courses.

In order to supplement the amount of information sources and to restore the content of the expenditure available in the Library, the study programme administration has purchased new textbooks. The table below summarises the number of textbooks purchased and the amount of money spent.

Year	Programme	EUR	Number of copies
2019	Geomatics	214,75	5
2018	Geomatics	689.18	5
2017	Geomatics	808.12	11
2016	Geomatics	636.65	11
2015	Geomatics	665.97	8
2014	Geomatics	632.10	7

In order to ensure the qualitative study process, FCE is carrying out extensive refurbishment works, upon their completion the Faculty will meet international standards for campuses and lecture halls.

Classification of the premises is given in the table below.

Room type	Number of rooms	Useful area m²
Meeting room	1	70.91
Computer rooms	4	243.77
Auditoriums	23	1702.34
Teachers' rooms, cabinets	69	1523.61
Assistant professor / Doctoral student premises	5	196.24
Workspace / workshop	6	172.19
Research facilities	6	350.53

Laboratories	35	1256.83
Resource room	6	213.53
Auxiliary room	11	197.99
Anteroom	3	35.89
Student self-government and record keeping	3	260.43
Kitchen	1	16.43
Total		**6240.69**

The Department of Geomatics, which implements the study programmes being part of the Faculty of Civil Engineering, has set up its own geodetic survey tool laboratory, in which students have the possibility to use geodetic laboratory equipment and relevant special computer programs for various study courses, such as “Geodesy”, “Practical Geodesy”, “Advanced Geodesy”, “Geodetic Measurement Processing”, “Global Positioning Systems” or other study courses. The following can be mentioned as examples:

1) precise tachymeters for surveying geodetic networks, with special software;

- leveling instruments for building high-altitude networks with data processing computer programs;
- Laser scanners for indoor and outdoor premises, with special programming equipment for the acquisition, processing and modelling of 3D data;
- cable locator;
- quartz spring gravimeter GNU-KV;
- professional drone – FlyTop, unmanned aerial vehicle FLYNOVEX with a control unit, six accumulators, battery charging equipment, high-definition camera and thermal camera FLIR VUE PRO, used by the Department of Geomatics in collaboration with the Institute of Civil Engineering and Real Estate Economics (ICEREE);
- Mavic 2 Enterprise Dual drone with smart controller equipped with high-performance cameras and thermal cameras, including programming for measured data processing;
- several GNSS receivers, including the latest and the most modern receiver and controller Leica Viva GS12 + CS15, which receives signals of GPS + GLONASS + GALILEO satellite systems.

Students can use the services provided by RTU Library (http://www.zb.rtu.lv/). They also have resource rooms at their disposal, where they can familiarise themselves with latest periodicals, statistical materials, books, conference materials on the topical issues in the field.

The Department also has a free-access special literature library, where a student can take a book of interest and return it afterwards.

The Scientific Library of RTU (https://www.rtu.lv/en/studies/scientific-library) is an academic library of state significance, which has obtained its status as a result of library accreditation. The Scientific Library of RTU provides the necessary information for RTU study process and research activities,

performs library, bibliographic and information services for RTU students, teaching staff, and employees. The Library's collection includes 1.4 million printed documents and e-resources in the databases relevant to RTU fields.

In 2016, significant investment was made in the development of the library infrastructure, with the construction of an additional 2240 m2 of space for the Central Library. The total area of the library premises is 6393 m2, of which 3417 m2 are for reader services. There are 713 workstations for library users. The library has four group rooms and six individual cubicles, a Western reading room and a conference room. The library is accessible to users with reduced mobility.

To improve the work of the Scientific Library of RTU and to ensure the availability of information needed for study and research work, the Library Council has been established, which decides on the replenishment of the library's collection with printed publications and subscriptions to the necessary databases. The Library Council has approved the "*RTU SL Collection Completion Policy*", which defines the basic principles of collection formation and development in accordance with the directions of RTU study and scientific activities.

When RTU provides funding for the library, the funding for information resources for each study programme is calculated. The collection is replenished according to the recommendations of the heads of study programme, researchers, and the allocated funding. The desired titles can be ordered by contacting the Library's Collection Development Department, ordering on the Library's website, filling in the order form, filling in the application form, by phone or by visiting the Library. The Scientific Library offers a guide to ordering titles and e-resources, which brings together the websites of various publishers and bookshops in Latvia and abroad.

Topical, innovative editions are annually purchased to expand the library stock of the study programme.

Database subscription contracts are concluded both directly with the supplier and through the "Cultural Information Systems Centre" state agency, which is the Latvian national representative of the international non-profit organisation EIFL (*Electronic Information for Libraries*, http://www.eifl.net/). The EIFL Licensing Programme offers national libraries subscriptions to internationally recognised databases at significantly reduced subscription fees not offered to individual subscribers, thus saving financial resources of the libraries.

The database subscriptions maintained by RTU Scientific Library

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

- 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.

- Databases financed by the Ministry of Education and Science available to RTU Scientific Library: ScienceDirect, SCOPUS (Elsevier), Web of Science.

- Latvian databases: LETA, Letonika, the Database of Latvian Standards (available on the premises of the Library).

Database usage at the Scientific Library of RTU has been growing since 2016. E-resource loans have increased from 75,391 to 525,194 items.

The new library premises have allowed to extend the range of services. Since the opening of the new premises in 2018, the number of visits to the library has increased from 103,825 to 235,600. The Scientific Library of RTU is open to everyone. The Central Library is open to users from Monday

to Saturday. There is a 24/7 reading room. During the summer period, the Central Library is open every weekday with reduced opening hours. ((https://www.rtu.lv/lv/studijas/biblioteka/pakalpojumi-3)in Latvian)

The library's sources are housed in an open-access collection. Books and periodicals according to the field of study and the UDC indexes are located in the central building of the Scientific Library, 5 Paula Valdena Street, Riga. The last copies of the oldest publications corresponding to the RTU profile are kept in the library repository. They are always available to the users.

The librarian on duty helps visitors find their way around the collection. Bibliographers (information specialists) provide more detailed information and advice. The library has a branch librarian service. (https://www.rtu.lv/lv/studijas/biblioteka/nozaru-informacija) in Latvian.

The library resource search is supported by the Primo Discovery search tool (https://www.rtu.lv/lv/studijas/biblioteka/vienota-informacijas-meklesana)in Latvian. It allows searching the library catalogue (RTU SL Catalog (UK) - Basic Search (kopkatalogs.lv)), the subscribed databases, as well as databases created by the RTU Scientific Library ((https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/bibliotekas-veidotas-datubazes)in Latvian) in one interface. Searching for information in the electronic joint catalogue (https://kopkatalogs.lv/F), it is possible to simultaneously obtain information on the resources available in 12 Latvian libraries. Both the electronic catalogue and the RTU portal ORTUS allow remote reservation of library resources, as well as remote access to the databases. Since the introduction of RFID technology, users can use five self-service book-dispensing machines and check out books from the pick-up machines around the clock.

The library provides students, academic personnel and other stakeholders with various levels of individual consultations and group training in information literacy ((https://www.rtu.lv/lv/studijas/biblioteka/lietotaju-apmacibas) in Latvian).

Publications not available in the library are delivered via an interlibrary loan or an international loan.

Internet access is available throughout the library. The library has copying, scanning, printing, binding services and a self-service dining room.

In turn, VGTU Library has additionally created a database uniting the most important editions and journals in the industry:

- Journal of Civil Engineering and Management (ISSN 1392-3730 print / ISSN 1822-3605 online),
- Journal of Geodesy (ISSN: 0949-7714 print / ISSN: 1432-1394 electronic version),
- Journal of Geodynamics (ISSN: 0264-3707),
- Journal of Geodetic Science (ISSN: 2081-9919 print version/ ISSN: 2081-9943 electronic version),
- Geophysical Journal International (ISSN 1365-246X online),
- ZFV: Zeitschrift für Geodäsie, Geoinformation und Landmanagement (ISSN 1618-8950),

Journal of Geodesy and Geoinformation.

The study courses of the lesson program are mainly held in specially equipped classrooms with the necessary equipment for presentation in the premises of the Department of Geodesy and Cadastre of VGTU, which ensures the availability of all types of audiovisual teaching and information materials, incl. direct internet connection. The VGTU will also be able to use the following special devices and equipment, such as the Leica ScanStation C10 laser scanner, the Leica tachometer TS30 0.5 sec., The ENVI PRO magnetometer set (2 units), the MinGeo 010A magnetic theodolite (2 units), the CG5 gravimeter receiver Leica Viva GS15, Software for GPS network processing Bern 5.0,

Leveler set Leica DNA 0.3 mm, GPS receiver Trimble 5700 (2 units) and other newly purchased instruments.

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

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

RTU funding from the state main budget consists of the base financing corresponding to a list of study programmes and the number of students, consisting of funds for utility payments, taxes, infrastructure maintenance (including the provision of data to the Register of Students and Graduates), the purchase of tools and equipment and personnel salaries, as well as financing for scientific activities.

The number of study seats is allocated upon discussions with the Ministry of Education and Science. The study base funding from the resources of the state budget is allocated to full-time studies. The amount of the study base funding is determined on the basis of the number of study seats specified by the state at RTU, as well as the base costs of the study seat determined by the state and the cost ratios of studies in thematic areas of education.

RTU funding from the state main budget for the provision of study seats for the relevant study year is allocated in accordance with the procedures specified in the RTU Senate decision “On the Methodology for Allocating and Spending the Main Budget, Performance Funding and Tuition Fees at RTU Organisational Units” for the respective academic year. This methodology is reviewed annually and approved in a new version, taking into account the necessary changes.

RTU has a decentralised budget and a separate budget is planned for each organisational unit. The budget is, in general, a revenue and expenditure plan for a specified period, work, measure or function. Revenues and expenses of RTU are managed on the basis of principles approved by the Senate or by the powers conferred on it by the Vice-Rector for Finance.

According to the Methodology, funding for organisational units is allocated either according to the financial or budget year, or immediately after receipt of funding. For RTU organisational units, a financial or budget year ranges from October to September of the following year, the following is calculated and allocated for this time period:

- subsidy or main budget funding (educating students for the state budget means) is allocated as a monthly limit – 1/12 of the calculated annual funding is allocated to an organisational unit per month;

- tuition fee funding (educating the tuition fee paying students, including debtors' fees) is allocated twice a year (October and April) as a monthly limit – 1/6 of the calculated semester funding is allocated to an organisational unit per month;
- performance funding (research support funding) is allocated as a monthly limit – 1/12 of the calculated annual funding is allocated to an organisational unit per month;
- research base funding (research support funding) is allocated as a monthly limit – 1/12 of the calculated annual funding is allocated to an organisational unit per month.

Analysing the procedure of funding of study programmes at RTU in general, it is seen that the main budget and tuition fee funding from local students is determined in the long term on the basis of the fundamental principles established by the state. In the process of setting the volume of funding, the cost ratios of studies in thematic areas and the values of study costs according to the level of the study programme, as well as the number of students in the study courses are taken into account.

As mentioned above, it is possible, through the cost ratios of studies in the thematic areas of education, to determine the amount of funding needed to carry out the specific study programme and study course. The RTU Senate has confirmed that, in future, the cost ratios for studies in the thematic areas of education will be applied individually to each study course of the study programme, thereby providing an even more appropriate amount of funding for the implementation of study courses of the study programmes. In order to implement this system by the order of the Vice-Rector for Academic Affairs, an Expert Commission was established which identified a thematic area for each study course. The actual costs of the study programme “Innovative Solutions in Geomatics” are as follows:

M/Gads	Dotācija programmai, EUR	Vietējo studentu studiju maksa, EUR	Ārzemju studentu studiju maksas, EUR	Kopā finansējums programmai, EUR	Vienas valsts budžeta vietas finansējums, EUR
2014./2015	0.00	0.00	0.00	0.00	0.00
2015./2016	0.00	0.00	0.00	0.00	5799.03
2016./2017	20316.08	0.00	0.00	20316.08	5799.03
2017./2018	19020.35	0.00	0.00	19020.35	6060.99
2018./2019	19817.41	0.00	0.00	19817.41	6344.52
2019./2020	18614.32	0.00	0.00	18614.32	6607.56

2020/2021 grants prog. 21504,93EUR, Costs per 1 student 6694,22 EUR.

Tuition fee is 2000 EUR per semester.

Financial resources of the study programme “Innovative Solutions in Geomatics” are sufficient for the study programme implementation and their usage is controlled regularly both on the part of the administration, and on the part of RTU Vice-Rector for Finance.

The available funding after the payment of remuneration is still used for the purchase of geodetic instruments, equipment, software, hardware renewal from the implementation of departmental projects or their deductions.

Information on the minimum number of students in RTU study programmes is provided in the appendix of the self-evaluation report "On minimal number of students in study programmes".

Information on the funding distribution between the cost items is provided in the appendix of the self-assessment report "Funding distribution between the cost items".

The specific development of each study programme is the responsibility of each study programme director, as well as the faculty responsible. For the development of all study programmes, central funding is used for the renewal of the research library, improvement and maintenance of shared classrooms, public relations, programme marketing activities, development and maintenance of information systems related to the study process, development of the Ķīpsala complex and other activities.

3.4. Teaching Staff

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

Qualifications of the academic staff involved in the implementation of the study programme conform to the terms and conditions for the implementation of the study programme and the requirements of regulatory enactments. The employees elected to the academic positions at RTU, guest lecturers and Doctoral students are involved in the implementation of the study programme.

The study programme also involves staff working on different research projects, so that the knowledge acquired in the projects can be transferred to the study programme, having improved the content of study courses.

Currently, 4 guest lecturers participate in the implementation of the study programme, however, this number is variable since the study programme administration is interested in attracting academic staff from other universities. These academic staff representatives work at other universities and enterprises and conduct certain study courses of the study programme in the form of exchange, thus ensuring mutual cooperation not only at RTU, but also with other universities. Training and qualification upgrade of academic staff take place through participation in conferences

and seminars, attending different courses, participating in the operation of other organisations, working as experts and consultants. Every year, academic staff take active part in methodological seminars organised by RTU and other universities.

The following academic staff members are involved in the implementation of the study programme:

Jānis Kaminskis, Dr.sc.ing., RTU Assoc. Prof., obtained and developed his professional scientific and pedagogic qualifications and competence at different universities in Finland, Denmark, Switzerland and now implements them in his academic, methodological and scientific research activities. Scientific interests of J. Kaminskis are related to different areas – geodesy, astronomy, gravimetry, land survey, geospatial information, civil engineering, both locally and internationally. Jānis Kaminskis is an engineering industry expert of the Latvian Council of Science in the field of construction, including geodesy and geoinformatics. Assoc. Prof J. Kaminskis is the author and co-author of over 95 scientific publications, including three books. Currently, he leads a number of Nordplus projects, including the following (from 2014 to 2022): Access to Geodetic Education for Society, No. NPHE-2014/10461; Geodetic Education Partnership, No. NPHE-2018/10380; Geodetic Education Partnership, No. NPHE-2019/10364 and Geodetic Education Build-up, No. NPHE-2020/10401. In addition to his main work, he is a member of the Presidium of the Nordic Geodetic Commission, chairs the Latvian National Association of Geodesy and Geophysics, acts as an academic member of the International Federation of Surveyors. ORCID iD https://orcid.org/0000-0001-6345-8084. The qualification of Assoc. Prof. Jānis Kaminskis complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study courses “Master Thesis with an engineering project”, and “Master Thesis”.

Mārtiņš Reiniks, Mg.sc.ing., Assist. Prof., Doctoral student. His interests involve geodesy, geodetic networks, laser scanning, unmanned aerial vehicles, engineering geodesy, remote exploration, global navigation satellite systems, spatial planning and land planning. M. Reiniks also works as a Manager at the Certification Centre of the Latvian Association of Surveyors, which performs conformity assessment and certification of the competence of surveyors (land survey, land cadastral survey and geodesic works. He is also a member of the Latvian Association of Surveyors, a member of the Geospatial Information Coordination Council and a member of the Surveying Advisory Council. He improves his qualification by attending conferences, seminars, including participation in different working groups. The qualification of Assist. Prof. Mārtiņš Reiniks complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study courses “Geodetic Networks”, “Topographic Mapping of Urban Area”, “Global Positioning Systems (study project)” and “Practical Placement”.

Olita Metuma, Mg.sc.ing., Assist. Prof. Her interests are related to geodesy, land management, land planning, territorial planning and real estate cadastre. She is a member of the Surveying Advisory Council and a member of the Latvian Association of Surveyors. The qualification of O. Metuma complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study courses, “Land Law”, and “Real Estate Management”.

Lauris Goldbergs, Mg.sc.ing., Lecturer, Doctoral student. His research interests include photogrammetry, unmanned aerial vehicles, global ground observation systems, astronomy, remote exploration, software, geographic information systems. He is a member of the Latvian Association of Surveyors and the Latvian Astronomical Society. He ensures qualification for work

with students by cooperating and obtaining experience with other universities and through regular participation in conferences, seminars and professional qualification upgrade courses. The qualification of Lauris Goldbergs complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study course "Computer Graphics in Geomatics".

Una Krutova, Mg.sc.ing., Guest Lecturer, Doctoral student. Her range of interests is surveying, cartography, databases, geographic information systems and their integration in the field of geomatics, open data. She takes part in the international project INTERREG CB "Coast4us" (1 January 2018–31 December 2020). She actively works at several organisations – as a Chairperson of the Board of the Latvian Association of Surveyors, as a member of the Board of the Latvian Association of Cartographers and Geodesists and the Latvian Association of Open Technologies. She also works at the Geospatial Information Coordination Council and at the Surveyal Advisory Council of the State Land Service. She upgrades her qualification by attending seminars, work groups, conferences, hackathons and professional qualification upgrade courses. The qualification of Una Krutova complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study course "Thematic Cartography".

Jānis Ancāns, Mg.sc.ing., Assist. Prof. The range of interests of J. Ancāns is geodesy, geodesic measurements, software, numerical models. He upgrades his qualification by attending seminars and conferences. The qualification of Jānis Ancāns complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study courses "Application Programs in Geomatics" and "Digital Terrain Models".

Jānis Zvirgzds, Dr.sc.ing., Assoc. Prof. Research interests of J. Zvirgzds are geodesy, geodetic measurements and calculations, geodetic networks, global navigation satellite systems. He upgrades his qualification by participating in different conferences, seminars and also GPS work groups of the European and national level. The qualification of Assoc. Prof. J. Zvirgzds complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study courses "Global Positioning Systems" and "GPS Heighting"

Armands Auziņš, Dr. oec., Associate Professor, has developed a number of training methodological materials, over 20 international scientific articles in the field of land management. A. Auziņš is a member of the European Academy of Land Use and Developmento. His scientific interests relate to land management, land planning and surveying, as well as territorial development planning. He upgrades his qualification regularly by attending seminars, conferences and professional qualification upgrade courses. Currently, he works within the project "A Values-Led Planning Approach for Sustainable Land Use and Development, Activity 1.1.1.2 "Post-doctoral Research Aid" of the specific aid objective 1.1.1 "To increase the research and innovative capacity of scientific institutions of Latvia and the ability to attract external financing, investing in human resources and infrastructure" of the operational programme "Growth and Employment" (No. 1.1.1.2/VIAA/1/16/161), 2017-2020.

The qualification of Assoc. Professor A. Auziņš complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study course "Fundamentals of Land Management" and "Real Estate Management".

Māris Kaļinka, Dr.sc.ing., Assoc. Professor. He takes part in international projects such as INTERREG

CB project “Coast4us” (1 January 2018–31 December 2020), “Height Precision Gravitation Model for Latvia, Including Sea Territory” (1 March 2018–up to now) and “Digital Platform iDārzs – For Sustainable Development of the Gardening Sector” (1 September 2019–up to now). He participated in projects such as “Development and Advanced Prefabrication of Innovative, Multifunctional Building Envelope Elements for MOdular REtrofitting and CONNECTions” (1 January 2014–1 January 2018). He is a Reviewer of the following scientific journals: The Baltic Journal of Real Estate Economics, Construction Management and Survey Review. M. Kaļinka’s scientific interest is related to urban planning, introduction of digitisation in construction and urban management, geodesy, databases, geographic information systems, laser scanning, photogrammetry and land planning. M. Kaļinka is the author and co-author of several scientific publications. He actively participates in various conferences, professional training courses, working groups, workshops, hackathons that increase his professional qualification. The qualification of Assoc. Prof. M. Kaļinka complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study courses “Geographical Information Systems”, “Geodetic Data Processing”, “Terrestrial Photogrammetry” and “Remote Sensing”.

The number of publications during the reporting period could be mentioned as one of the most important indicators for the high-quality scientific research of RTU academic Master study programme. For example, between 2015 and 2021, a total number of 183 articles written by academic staff of the academic Master study programme were published in the journals cited in the SCOPUS database, of which 57.9% were Open Access journals. Among SCOPUS indexed articles, from 2015 to 2021 a total of 98 publications were written in the fields of Environmental Sciences (26.8%), Engineering (15.9%), Earth and Planetary Sciences (4.0%). In the period of 2015-2021, publications of academic staff of the academic Master study programme “Innovative Solutions in Geomatics” contributed to the development of 65 thematic areas (41 thematic clusters). The year-by-year dynamics of changes in the number of publications are given in the figure below.

SCOPUS indexed publications written by the academic staff of the academic Master study programme “Innovative Solutions in Geomatics” (2015-2021 SciVal)

Figure. The number of scientific articles of the academic staff of the academic Master study programme “Innovative Solutions in Geomatics” (data for 2020 and 2021 are not complete).

Between 2015 and 2021, 183 publications have been quoted 754 times, an average of 4.1 citations to 1 publication. 8.2% of publications are among the most quoted publications in the world, while 12.9% of scientific articles (18 publications) have been published in CiteScore top 10% journals.

In general, the data show the qualifications of academic staff. According to the qualifications, the quality of study courses can be ensured by the academic staff. Many members of the academic staff also work directly in the geodesic and cartographic sector, thus transferring the skills and competences of practical work to the study programme.

Currently, there is one guest lecturer working at the study programme. Such academic staff members work at other universities but also conduct certain courses in the form of exchange in the study programme, thus ensuring cooperation not only within RTU and VGTU but also with other universities.

The students spend in VILNIUS TECH in the second semester of study programe. The teacher staff were one person from RTU, three from VILNIUS TECH Department Geodesy and cadaster and one person from UK. All teaches (100%) has the doctoral degree. According to VILNIUS TECH requirements, it must be up to 80%. The three lecturers are professors and two others – assoc. professors. RTU - Assoc. Prof. dr. Maris Kalinka; VILNIUS TECH - Prof. dr. Jūratė Sužiedelytė Visockienė; Prof. dr. Eimuntas Kazimieras Paršeliūnas; Assoc. Prof. dr. Darius Popovas; Liverpool John Moores University – prof. dr. Vida Malienė. All staff were high-level professionals and highly regarded specialists in the geodesy, geomatics field and professor from UK – Real Estate fields. They also regularly participates in scientific conferences and promotes professional qualifications, as well as conducts research and publishes SCOPUS or WoS scientific articles. English level is equivalent to B2 or higher. List of publications of staff and students of the department of Geodesy and Cadaster is in the Internet site. The lectures are member of national and international association, Scientific Organizing Committees and journals editorials boards. Also the collaboration with universities, companies and associations.

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

The academic staff holding a degree of Doctor of Engineering Sciences and lecturers or highly qualified professionals with the relevant work experience, whose characteristics are provided in their CV, participate in the process of implementing the academic Master study programme. The academic staff CVs are given in the Annex. Academic staff comply with the requirements for the implementation of study courses. This is demonstrated by both their characteristics and CV, as well as by their scientific and methodical publications and the participation in scientific and methodical conferences organised internationally, by RTU and the Faculty of Civil Engineering or VGTU.

Characteristics of the academic staff are provided in the table:

Parameters	Quantity	Percentage, %
Positions:		
Professors	3	17.6

Among them guest professors of which visiting professors from VGTU	*3*	*17,6*
Associate professors	8	47.1
Among them guest associate professors VGTU	*4*	*23,6*
Assistant professors	2	11.8
Lecturers	4	23.5
Guest lecturers VGTU	*1*	*5,9*
Total:	**17**	**100**
Academic degrees:		
Doctoral degree (7 VGTU)	11	64.7
Master degree (1 VGTU)	6	35.3
Total:	**17**	**100**
By the age:		
under 30	1	5.9
31 - 40 (1 VGTU)	3	17.6

41 - 50 (5 VGTU)	10	58.8
51 - 60 (1 VGTU)	2	11.8
above 60	1	5.9
Total:	**17**	**100**

In general, the data show the qualifications of academic staff. According to the qualifications, the quality of study courses can be ensured by the academic staff. The number of academic staff members who have obtained the Doctoral degree has not changed during the reporting period. There are professors and associate professors working at the study programme, ensuring that 64,7% of academic staff members hold a Doctoral degree.

It should be mentioned that this is a joint study programme, therefore, guest professors, associate professors and guest lecturers are invited to the study programme. A number of instructors with more than 10 years of practical work experience continue their advancement at Doctoral studies. A number of instructors also work directly in geodesy and cartography, thus transferring the skills and competences of practical work to the study programme. Analysing the age structure of academic staff involved in the implementation of the programme, the number of academic staff members who are above 60 has decreased, i.e., currently they make 5.9% of the total number of academic staff. The number of academic staff who have reached the age threshold of 41-50 has increased, i.e., 58.8% of the total number of academic staff. The study programme administration attracts Doctoral students to participate in the implementation of the study programme. At present, their number is 4, representing 23.5% of the total number of academic staff.

The academic staff involved in the flow of students of the programme has the appropriate language proficiency level necessary for the implementation of the study programme. The study programme administration is addressing the problem of proving language proficiency as the RTU Senate made a decision on the procedure for language recognition. As a result, the number of guest lecturers working at international companies has decreased, as they are not aware of the procedure developed by RTU for proving language levels by passing IELTS or TOEFL tests. In general, the data show the qualifications of academic staff. According to the qualifications, the quality of study courses can be ensured by the academic staff. A number of lecturers work in parallel directly in the real estate sector, thus transferring practical skills and competences to the study programme.

4 professors and 3 associate professors holding a Doctoral degree in the respective field of science, the scientific and pedagogical qualifications of whom comply with the criteria specified in the regulations regarding the evaluation of the scientific and pedagogical qualifications, take part in the implementation of the study programme on the behalf of VGTU.

Due to the fact that the implementation of the study program takes place for a short time, there have been no changes in the composition of the teaching staff, thus the quality of the study program remains at a high level.

3.4.3. Information on the number of the scientific publications of the academic staff members, involved in the implementation of doctoral study programme, as published

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

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

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

The interrelation among the study courses and their logical, sequential learning are essential to achieving the learning outcomes of the study programme. In general, a framework has been established to promote cooperation between faculty and university staff, which provides regular academic conferences and professional training seminars for the development of methodological competencies. An example is the academic conference of 27 April 2018 entitled “Integration of Methodological and Scientific Work into the Study Process”. Such measures contribute to the development of the academic staff and promote more efficient cooperation in achieving results and improving study courses.

The study programme carried out by the Department of Geomatics is interdisciplinary. The content of the programme consists of civil engineering, geodesy, geoinformatics, cartography, land survey, geography, other cross-sectoral engineering, BIM, geophysics and environmental protection. As a result, academic staff from different organisational units are involved in the implementation of study courses and professionals in the sector are attracted. For example, academic staff of the Department are involved in the implementation of the study course “Scientific Research and Innovation”, while individual themes are presented by invited guest lecturers from other universities, for example LULST.

The sequence of study courses is followed to progress from the simplest and general education to a more complex and professional level, enabling interlinking and improving development to be ensured, as well as reaching certain degree of specialisation. After each semester, the department

responsible for the study programme implementation evaluates the progress of the study process and the learning outcomes at a meeting. Student surveys on the quality of study courses play an important role in this process. Based on an analysis of the current situation, solutions are found. For example, adjustments have been made to the structure of individual study courses in order to avoid partial duplication and improve interconnection between the study courses, or changes to the content of the study programme have been proposed for its development.

Faculty members of RTU and Vilnius Gediminas Technical University (VGTU) maintain regular contacts, meeting at least once a semester. Meetings of the State Examination Commission for the Defense of Master's Theses are jointly organized. After their conclusion, the students' performance is discussed and the study program is evaluated. We participate in scientific and pedagogical conferences together. We jointly apply for projects in the Nordplus program and elsewhere. As a result of cooperation, scientific articles are created, where, for example, the latest article is at the conference in 2021: Visockiene, J., Kaminskis, J., Popovas, D., Kalinka, M., Parseliunas, E., Obuchovski, R., Slikas, D., Stāmure, I. Experience of Management and Study of the Joint Master Degree Study Program "Innovative Solutions in Geomatics". In: EDULEARN21: 13th International Conference on Education and New Learning Technologies: Conference Proceedings, Online Conference, 5-6 July, 2021. Valencia: IATED Academy, 2021, pp.235-243. ISBN 978-84-09-31267-2. ISSN 2340-1117. Available from: doi: 10.21125 / edulearn.2021.0082

The ratio of students to teaching staff within the program is 1.6 (or 5 teachers are employed per 8 students). We are working to double or increase this ratio many times over.

Annexes

III - Description of the Study Programme - 3.1. Indicators Describing the Study Programme		
Sample of the diploma and its supplement to be issued for completing the study programme	Diploma pielikumi LV_ENG.zip	Diploma pielikumi LV_ENG.zip
For academic study programmes - Opinion of the Council of Higher Education in accordance with Section 55, Paragraph two of the Law on Higher Education Institutions (if applicable)	AIP Conclusion - InnovativeGeomatics.pdf	Akadēmiskajām studiju programmām - Augstākās izglītības padomes atzinums.pdf
Compliance of the joint study programme with the provisions of the Law on Higher Education Institutions (table) (if applicable)	Annex 4.zip	4.pielikums.zip
Statistics on the students in the reporting period	5. pielikums Studiju statistika InovatvieENG.pdf	5. pielikums Studiju statistika 1.2_Inovativie.pdf
III - Description of the Study Programme - 3.2. The Content of Studies and Implementation Thereof		
Compliance with the study programme with the State Education Standard	Annex 6.pdf	6_piel.Studiju programmas salidzinajums ar valsts izglitibas standartu.pdf
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard or the requirements for professional qualification (if applicable)		
Compliance of the study programme with the specific regulatory framework applicable to the relevant field (if applicable)		
Mapping of the study courses/ modules for the achievement of the learning outcomes of the study programme	8.pielikumsENG.pdf	8.pielikumsLV.pdf
The curriculum of the study programme (for each type and form of the implementation of the study programme)	Annex9.pdf	9.pielikums RBMR0_ABMR0.pdf
Descriptions of the study courses/ modules	10_ENG.pdf	10_LV.pdf
Description of the organisation of the internship of the students (if applicable)		
III - Description of the Study Programme - 3.4. Teaching Staff		
Confirmation that the academic staff of the doctoral study programme includes not less than five doctors, of which at least three are experts approved by the Latvian Council of Science in the branch or sub-branch of science in which the study programme intends to award a scientific degree (if applicable)		
Confirmation that the academic staff of the academic study programme complies with the requirements specified in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions (if applicable)	Confirmation - on compliance of the academic staff.edoc	Apliecinājums - AL 55. pants par prof. skaitu akadēmiskās programmās.edoc

Heat, Gas and Water Techology (51582)

Study field	*Architecture and Construction*
ProcedureStudyProgram.Name	*Heat, Gas and Water Techology*
Education classification code	*51582*
Type of the study programme	*Doctoral study programme*
Name of the study programme director	*Egils*
Surname of the study programme director	*Dzelzītis*
E-mail of the study programme director	*egils.dzelzitis@rtu.lv*
Title of the study programme director	*profesors/ habilitētais doktors*
Phone of the study programme director	
Goal of the study programme	*The aim of the Doctoral study programme is to educate and train highly qualified and competitive professionals in the field of heat, gas and water technology with an in-depth body of knowledge, skills and competences, that are able to solve scientific tasks, work as lecturers, assistants, researchers in universities and research institutes. In addition, the aim of the programme is to prepare highly qualified specialists for private and municipal entities, that provide residents with engineering services such as heat, gas, water and sewerage systems.*
Tasks of the study programme	*The tasks of the study programme:* *- to enhance the development of the heat, gas and water technology field;* *- to prepare students for an in-depth individual scientific research in the selected field;* *- to develop skillset to individually carry out scientific problem solving, report and publish research results, as well as obtain the required skillset and experience to conduct pedagogical work.*

Results of the study programme	*Graduates of the study programme:* *- are familiar with building engineering systems' and urban infrastructure systems' design, installation and operation requirements as per compliance with local and regional building norms, as well as able to determine the applicable standards to the aforementioned systems and ensure their execution within the framework of one's authority;* *- are able to identify the factors and risks affecting the operation quality of building engineering systems and urban infrastructure systems, as well as able to determine preventive measures with respect to quality risks;* *- are able to assess, manage and develop building engineering systems' and urban infrastructure systems' design, installation and operation processes and their interaction, as well as able to determine their modernization measures;* *- are able to understand the core indicators and operational budget development principles for building engineering systems' and urban infrastructure systems' design, installation and operation processes, as well as plan and project necessary resources for a successful and streamlined operation of a construction firm or a municipal enterprise;* *- are able to determine the required competence level, skillset and responsibility distribution of employees to ensure a successful operation of a construction firm or municipal enterprise;* *- are able to supervise and perform the design, installation and operation of building engineering systems and urban infrastructure systems;* *- are able to develop, implement and upgrade the design, installation and operation of building engineering systems and urban infrastructure systems in accordance with the innovative approaches and principles;* *- are able to carry out research work of a scientific value in the field of design, installation and operation of building engineering systems and urban infrastructure systems, as well as interpret and analyze the acquired results;* *- are able to continue their career in the role of a engineer, as well as continue their academic education in Master study programmes.*
Final examination upon the completion of the study programme	*To obtain a PhD degree it is important to complete Doctoral study programme and defend Doctoral thesis. The rules and procedure of submitting and defending of the Doctoral thesis and awarding the scientific degree are prescribed in Cabinet of Ministers of the Republic of Latvia regulation no. 1001.*

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)	*professional master's degree in construction of heat, gas and water engineering systems or professional master's degree in transport structures, or professional master's degree in construction, or equivalent education*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Doctor of Science (Ph.D.) in Civil engineering and Transport Engineering; or Doctor of Science (Ph.D.) in Environmental Engineering and Energy; or Doctor of Science (Ph.D.) in Environmental Biotechnology*
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 - 4 years - english

Study type and form	*Full time studies*
Duration in full years	*4*
Duration in month	*0*
Language	*english*
Amount (CP)	*192*
Admission requirements (in English)	*professional master's degree in construction of heat, gas and water engineering systems or professional master's degree in transport structures, or professional master's degree in construction, or equivalent education and for the studies in English , the level of knowledge of English at least B2*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Doctor of Science (Ph.D.) in Civil engineering and Transport Engineering; or Doctor of Science (Ph.D.) in Environmental Engineering and Energy; or Doctor of Science (Ph.D.) in Environmental Biotechnology*
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

3.1. Indicators Describing the Study Programme

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

The PhD study programme “Heat, Gas and Water Technology”, education classification code 51582, accredited by decision of the Study Accreditation Commission of the Ministry of Education and Science of the Republic of Latvia, 29 May 2017, Accreditation certificate No. 49.

Profile	Heat, Gas and Water Technology
Level of study	Academic Doctoral Studies
Programme code	RBDS0
Duration of studies	4 years (8 semesters)
Volume of studies	192 credit points (288 ECTS)
Previous education	Master degree or equivalent education
Degree to be obtained	Doctor of Science (Ph.D.)

The title of the awarded degree was changed during the reporting period. Amendments to the Cabinet regulations No.1001 of 27 December, 2005 “The Procedure and Criteria for Awarding of a Doctoral Degree” stipulate that “The degrees with the titles specified in the decision on accreditation of relevant Doctoral programmes before 17 August 2018” can be awarded until 31 December 2019.” (Clause 41). From 1 January 2020 the awarded academic degree is PhD”.

RTU submitted an application to the Academic Information Centre with the request to update the accreditation fact sheet for the field of study, having specified the awarded academic degree of PhD as the main amendment and the relevant field(s) of study in the study programme, according to the Cabinet regulations No.49 of 23 January 2018 “Guidelines on the Latvian Scientific Fields and Sub-fields”, as well as an application to the Latvian Council of Science on granting authority for awarding PhD degrees to RTU in the corresponding research fields.

On 4 May 2020, the decision of the Latvian Council of Science was received, where the Council approved the RTU application for granting degree awarding authority in such fields of study as civil engineering and transport engineering, music, visual art and architecture, environmental and power engineering, environmental biotechnology, as well as the appropriate amendments to the Cabinet regulations of 27.12.2005 “Guidelines on granting authority to award PhD degrees to higher educational establishments”.

On 6 May 2020, RTU received the decision of the Higher Education Quality Commission No. 2020/21-I of 30 April 2020 on amendments to the accreditation data sheets for the field of study “Architecture and Civil Engineering”.

All study courses of the previous period have been retained during the reporting period. The lecturers in charge have been replaced at the following study courses: “Special Studies of Gas Supply”, “Special Studies of Heat Technology”, “Advanced Solutions in Energetics”, “Optimisation of Indoor Climate” and “Specialised Research Seminars”. The replacement of lecturers is related to their retirement and/or the non-renewal of the expert status of the Latvian Council of Science.

Implementation of the study programme occurs only on full-time basis (4 years). The study

programme is implemented in Riga in Latvian. If necessary, academic staff are able to provide instruction in English.

Introduction of recommendations received in the previous accreditation:

1. Support should be granted for the development of research papers and to the new PhD students in order to complete the PhD Thesis. RTU persistently supports the new PhD students by organising Doctoral School seminars dealing with important issues of PhD Thesis as well as giving recommendations for successful public presentation of the Thesis. Implementing the recommendations of international experts of the Accreditation Commission, RTU Office of Vice-Rector for Research offers support to young scientists after Doctoral studies. A pre-selection of post-doctoral applications was thus announced in 2018 for the submission of research applications under measure 1.1.1.2 “Post-doctoral Research Support”. The aim of the pre-selection contest is to choose postdoctoral researchers who would contribute significantly to the development of excellent research at RTU.

Essential conditions:

- postdoc – Latvian or foreign scientist who obtained a PhD degree after 15 December 2012;
- for the implementation of the research application, a postdoc researcher shall be employed full-time at RTU;
- the maximum duration of the research project shall be 36 months;
- a postdoc researcher may receive a salary of up to EUR 2,731 per month (including all taxes) and support for the purchase of research materials, study and business trips of EUR 800 per month;
- implementation of the project requires support of the head of RTU unit and a scientific adviser for the postdoc researcher.

During the reporting period, several postdoc projects have been implemented by the Institute of Heat, Gas and Water Technology. Thus, Jurģis Zemītis, Aleksandrs Zajacs, Jeļena Tihana, Lana Migla, the graduates of the Doctoral study programme “Heat, Gas and Water Technology”, have received grants.

RTU Office of Vice-Rector for Research has been announcing annual grant contests within RTU PhD studies for several years. The total amount of one grant is EUR 10,000 spent on salary of a PhD student, covering the costs of at least 650 working hours in the position of scientific assistant and/or researcher. The relevant department may provide additional funding for the remuneration of the researcher for at least 800 additional working hours, providing the application with a higher priority in the evaluation process. The grant funding of up to EUR 3,000 may be used to cover the costs of purchasing materials, equipment, publications, scientific discussion (conferences) and capacity building.

Eligibility for for a grant:

- 1-year PhD students;
- 2-year PhD students who have at least one full-text publication related to the PhD Thesis, which is indexed in the Web of Science and/or Scopus database (the requirement does not apply to PhD students in the field of music, visual arts and architecture);
- 3-year PhD students who have at least two full-text publications related to the PhD Thesis, which are indexed in the Web of Science and/or Scopus database and one of them has been published in a journal (the requirement does not apply to PhD students in the field of music, visual arts and architecture);
- 4-year PhD students who have had the pre-defence of the PhD Thesis and at least three full-text publications related to the PhD Thesis have been published, which are indexed in the

Web of Science and/or Scopus database and one of them has been published in a journal (the requirement does not apply to PhD students in the field of music, visual arts and architecture).

In addition, PhD students have a monthly grant of EUR 113.83 for the acquisition of the study programme in 2021.

Seven students of the PhD programme have received the grant.

2. Laboratory equipment needs to be improved as a matter of urgency so that the latest technologies are available to students. In 2019, the process of reconstructing the building of the Faculty of Civil Engineering was launched. The implementation of the project is intended to significantly expand the area of the premises of scientific and study laboratories and to improve their equipment. In total, 4 large-use laboratory rooms with a total area of 280 m2 are provided for the Institute of Heat, Gas and Water Technology. In addition, RTU laboratory building premises are available, where a combined (solar collectors and PV batteries) solar test stand is installed on the roof. The stand is equipped with multiple sensors and data loggers. The simulation programs have also been obtained: TRNSYS, IDA-ICE, DELPHIN. Until now, COMSOLPHYS, Mathlab were available.

3.To ensurebetter access to databases. The Scientific Library of RTU for many years maintains subscription and provides access to 14 databases, including Web of Science and SCOPUS. They are available to all RTU students, including PhD students. It is possible to get access to electronic catalogue of the Library 24 hours 7 days a week from any location with the Internet connection. Library home page also provides information on e-resources. ORTUS provides permanent access to the e-resources.

Subscription to the Data Bases maintained by RTU Library:

- *ACM Digital Library* offers high quality publications in computer science.
- *EBRARY* – 46,500 e-books in English in various research fields.
- *EBSCOhost* platform data bases (16) cover periodicals in computer science, engineering, humanities and social sciences, economics and other fields. It includes *Academic Search Complete* – one of the most comprehensive full text journal data bases. It comprises full texts of 8,500 periodicals.
- *EBSCO eBook Academic Collection* – more than 144,000 e-books in various research fields.
- *IEEE Xplore Digital Library* – the most comprehensive data base package, which features all full text journals, conference proceedings, scientific journals and standards of the Institute of Electrical and Electronics Engineers (IEEE) and Institution of Engineering and Technology (IET).
- *Data base of the Latvian standards*
- *LETA* – national news agency database.
- *Letonika* – includes numerous dictionaries and encyclopedias.
- *ScienceDirect* – more than 2,500 journals (Freedom Collection, from 2002 to 2005) and full texts of 340 books.
- *Scopus* – research literature bibliographic indexing database, which ensures integrated access to high quality literature, providing a search engine for information search in scientific peer reviewed sources;
- *SpringerLink* – access to more than 4,600 e-books (published in 2014 and 2015) in the following areas: computer science, engineering, chemistry;
- *Wiley Online Library* – more than 1,360 full text journals in various research fields including engineering and architecture;
- *Web of Science* – the leading electronic resource research platform maintained by *Thomson Reuters* publishing house. The resource unites several functions – information search tool in

bibliographic (citation) data bases, it helps find the newest and most significant scientific publications in high impact factor journals, conference proceedings, etc., it also shows citation indexes of the publications.

Open Access E-book Resources:

- *Directory of Open Access Books* (DOAB) – 5,400 scientific e-books in various fields from 161 publishing house including sources on engineering and architecture. The project is run by OAPEN Foundation funded by the European Union and coordinated by Amsterdam University Press.
- *Europeana* – allows viewing European cultural collections: books, paintings, pictures, audio recordings.
- *Gallica* – French archive, which aims at digitalizing the entire stock of the French National Library.
- *Google Books* – Google book search engine. If the book is not covered by copyright or if a publisher has given permission, it is possible to view the text of a book or certain parts of the text.
- *Open Library* – online project established to create "one web page for each published book", provides access to more than a million books. Open Library is the project of Internet Archive.
- *Wikibooks* offers open access course books. Anyone can create and edit any course book, freely read it, copy, publish and modify its content. The majority of books is written in English, but there also books in other languages.
- *NeHudLit.Ru* – library of research and technical literature in Russian. The library also stocks books in civil engineering.

Open Access E-journals:

- *RTU Zinātniskie raksti* – peer reviewed periodical scientific publication, which unites papers by RTU researchers and Doctoral students, as well as foreign researchers. Provides access to full texts since 2008. Journal Construction Science. Journal Arhitektūra un pilsētplānošana (Architecture and Urban Planning).
- *Directory of Open Access Journals* (DOAJ) – offers search and open access tools to full texts published in scientific e-journals in all fields and in all languages. More than 2 million articles in 9,200 journals are available, including architecture and engineering.
- *De Gruyter Open journals* – 435 open access journals.
- *Electronic Journals Library* – the Library of the University of Regensburg maintains a database of e-journals in various fields including civil engineering and architecture. Certain journals provide access to full texts.
- *ScienceDirect Open Access journals* – 583 open access journals.

Open Access Dissertations:

- *DART-Europe E-theses Portal* – offers open access to dissertations and dissertation summaries developed at the European universities. At present, the data base stocks more than 301,000 dissertations from universities of 23 European countries.
- *DissOnline* – information system, which provides ample information about e-publishing of dissertations. Provides access to full texts of dissertations developed in German and Swiss universities.
- *NARCIS* – collection of digital documents of Dutch universities and other research institutions. Full text books, journal articles, dissertations and other materials in English and Dutch are provided in open access.
- *Networked Digital Library of Theses And Dissertations* (NDLTD) – intentional organization, which deals with recognition, design, usage, dissemination and storage of electronic versions

of dissertations.
- *OpenThesis* – free repository for Master Theses, dissertations, and other academic papers. It is possible to register and upload one's works.

Institutional and field specific repositories:

- *RTU Open Access repository* – ensures summarization, storage and access to scientific publications of RTU. The repository provides free access to full texts of edition "Scientific Journals of RTU" and publications by RTU academic and research staff, which are stored in the Repository in accordance with copyright laws.
- *CogPrints* – cognitive science data base, contains full texts of articles in psychology, linguistics, computer science, biology and other related fields.
- OpenAire – the network of European research repositories, which provides an integrated search tool. Coverage – 17 million documents from 5,600 repositories and open access journals.
- *OpenDOAR* – summarized information on open access repositories, ensures search options in all repositories either simultaneously or separately.
- *SHERPA/RoMEO* – offers information on publishing policies and guidelines in the field of copyright.

To purposefully develop the stock of RTU Scientific Library in accordance with RTU education areas and research needs, RTU academic staff has the opportunity to order publications and e-resources to complement the library stock.

Was changed the reception requirements of the doctoral programme "Heat, Gas and Water Technology" (identification code BDS0) from "engineering master" to "professional master's degree in the construction of heat, gas and water engineering systems or professional master's degree in transport, or professional master's degree in construction or equivalent education (In accordance with the decision of the RTU Senate of 27 September 2021 (Protocol No 653)).

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

The PhD study programme "Heat, Gas and Water Technology" is implemented according to the Law on Higher Educational Establishments of 2 November 1995, the Law on Scientific Activity of 19 May 2005, and the Law on Education of 29 October 1998, as well as in accordance with the Cabinet Regulations No.1001 "On the Procedure and Criteria for Awarding Doctoral Scientific Degree" of 27 December 2005, RTU Constitution, RTU Senate decisions and RTU regulations on the Doctoral studies. The programme is implemented in Latvian and English. Program code 51582 complies with the regulations of the Cabinet of Ministers No. 322 Regulations on the Classification of Education in Latvia. The first and second classification levels, denoted by the first two digits of code 51, are Doctoral studies (doctoral degrees), to be implemented after obtaining a master's or professional master's degree or as a continuation of an education program with code 49. Duration of full-time studies is three to four years. The third, fourth and fifth levels of classification

(education thematic groups, thematic areas and program groups), denoted by the next three digits 582 are Civil Engineering (58 denotes Architecture and Civil Engineering).

The aim of the Doctoral study programme is to educate and train highly qualified and competitive professionals in the field of heat, gas and water technology with an in-depth body of knowledge, skills and competences, that are able to solve scientific tasks, work as lecturers, assistants, researchers in universities and research institutes. In addition, the aim of the programme is to prepare highly qualified specialists for private and municipal entities, that provide residents with engineering services such as heat, gas, water and sewerage systems. The programme addmit students who have a professional master's degree in the heat, gas and water engineering systems or a professional master's degree in transport, or a professional master's degree in construction, or an equivalent education. The tasks of the study programme is to enhance the development of the heat, gas and water technology field; to prepare students for an in-depth individual scientific research in the selected field;
and develop skillset to individually carry out scientific problem solving, report and publish research results, as well as obtain the required skillset and experience to conduct pedagogical work.

For English-language flow students, admissions requirements set a minimum level of English learning B2. No students have been addmitted in the English flow since previous accreditation, but in view of the increase in RTU students and trends, foreign students are scheduled to be admitted in the coming years, because of interest. In accordance with the decision of the RTU Senate of 26 November 2018, the Latvian language course is compulsory for foreign students in addition to the study programme content (VSL711 Latvian Language for Foreign Students).

In the course of studies, the quality of learning outcomes is provided by the system of cross-compliance of the enrolment requirements with the study aims and tasks, the general principles are defined in RTU Regulation on Doctoral Studies https://www.rtu.lv/en/studies/doctoral-studies Throughout the PhD studies, students acquire competencies and research techniques, conduct scientific research of certain issues and give scientifically substantiated recommendations for various fields of building construction, sub-fields of heat, gas and water technology, concerning both opportunities offered by new technologies, and advantages of new construction materials and other recommendations.

The programme corresponds to the Guidelines for development of education in 2021-2027 “Future skills in the future society” https://www.izm.gov.lv/lv/media/13864/download (In Latvian) and highly qualified academic staff and scientists in Civil Engineering are educated and trained in the course of their implementation. PhD study programmes are improved according to the requirements of the European Framework for Qualifications, the Bologna process, and other regulations.

Persons with a Master degree or education equivalent to a Master degree, which complies with the requirements of the prescribed PhD programme for prior education, may be enrolled in the study programme. Applicants who have not obtained a Master diploma issued by the Republic of Latvia but have an educational document corresponding to this level of education must carry out recognition of the previously acquired higher education at the Academic Information Centre (hereinafter – AIC). Persons who have acquired prior education abroad may apply for studies at RTU if their assessment of the conformity of the educational documents has been carried out by the AIC and has been recognised by the Scientific Committee of the relevant faculty. The process of enrolling PhD students is governed by the “Admission Requirements for Doctoral Study Programmes” approved by the RTU Senate.

Aims of the study programme:	The main aim is to prepare highly qualified specialists in field of heat, gas and water technology, which can address the scientific challenges and work as lecturers, assistants, researchers at universities and research institutes. In addition, the doctoral program is designed to programmed educate experts for private, public, and municipal companies which provide centralized heat supply, gas supply, water supply and sewerage.
Tasks:	- to facilitate development of heat, gas and water technology sector, preparing students for in-depth independent research and developing the ability to independent scientific problem definition and solve, to prepare scientific reports and publication, to present them for scientific audience, addition skills to get teaching skills and experience.
Learning outcomes:	- assessment results within the study courses in the study programme, - developed PhD Thesis, - total number of publications, including publications indexed in SCOPUS database. - participation in scientific conferences with reports, - improved pedagogical competence.

Graduates of the study programme (learning outcomes) are able:

- to demonstrate an understanding of the requirements of the regulatory enactments for design, installation and operation of building engineering systems and urban infrastructure systems, as well as to define the standards applicable to those systems and to ensure that they are implemented within the limits of their powers;
- to identify factors and risks affecting the performance of building engineering systems and urban infrastructure systems, to identify quality risk-sensitive preventive measures;
- to identify, evaluate, manage and improve design, installation and operational processes of building engineering systems and urban infrastructure systems and their interaction, and to identify their development activities;
- to demonstrate an understanding of the basic economic performance indicators for the design, installation and operation of building engineering systems and urban infrastructure systems, the principles for establishing the budget for operational activities and to plan the necessary resources in order to ensure successful operation and development of the building company or municipal enterprise;
- to determine the necessary competencies, responsibilities and authority of the employees of the building company or local government company in order to ensure and improve the success of the undertaking;
- to manage and perform the design, installation and operation of building
- engineering systems and urban infrastructure systems;
- to establish, implement and develop basic principles for design, installation and operation of building engineering systems and urban infrastructure systems;
- to independently plan and carry out research of a scientific value in design, installation and operation of building engineering systems and urban infrastructure systems, to interpret and analyse their results.

The aims, tasks and learning outcomes of the PhD study programme “Heat, Gas and Water Technology” are interlinked and their reachability is very high. The study programme contributes significantly to achieving European climate neutrality and to developing the National Energy and Climate Plan. The content of the programme makes a significant contribution to the “Construction” study courses in the field of energy efficiency in buildings, sustainable energy supply and water supply. The study programme aims to promote the development of the heat, gas and water technology sector by preparing students in the area chosen for deep independent scientific research (heat, gas and water).

Students choose limited-choice study courses when choosing the subject of PhD and the field of science. The number of credits for studies in heat and gas technology programme: 34 CP. The number of credits for studies in water technology programme: 29 CP. The study courses in heat and

gas technoogy programme focus on innovative product and solution development in the field of energy efficiency, as well as in inegrating renewable energy uptake at the end-user and/or manufacturer side. The study courses in water technology programme focus on safe and continuous operation of water engineering system infrastructure, development of wastewater treatment technology, as well as development of contamination monitoring methodology.

Further, in addition to the subject of doctoral thesis, it is proposed to obtain a degree in one of the three fields of science. If work-oriented on engineering systems, constructive solutions, the student can defend in *construction and transport engineering* field, if the work involves energy efficiency, energy savings, heating solutions, environmental impacts, water quality, then the student defend the work in the field of *environmental engineering and energy*, while if the work is focused on determining and eliminating water pollution, then the work is defended in the field of *environmental biotechnology*.

The study programme promotes implementation of the leitmotif of Riga Technical University (RTU) as defined in its 2021-2025 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 educated and trains European and global-level engineers – leaders: developers of new technologies*."

(https://www.rtu.lv/en/university/strategy).

The study programme fully complies with the development aim of RTU Faculty of Civil Engineering – to become an internationally recognized leading Latvian educational, research and development institution in the field of civil engineering, providing high quality study process, internationally recognized research and sustainable innovation, commercialization and knowledge transfer for economic development.

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

The PhD study programme "Heat, Gas and Water Technology" is implemented according to the Law on Higher Educational Establishments of 2 November 1995, the Law on Scientific Activity of 19 May 2005, and the Law on Education of 29 October 1998, as well as in accordance with the Cabinet Regulations No.1001 "On the Procedure and Criteria for Awarding Doctoral Scientific Degree" of 27 December 2005, RTU Constitution, RTU Senate decisions and RTU regulations on the Doctoral studies.

The economic and social substantiation of the study program is based on performed industry surveys, which are regularly performed on annual basis by the Ministry of Economics, and it is aimed at following up the development trends of the architecture and civil engineering field, including fluctuations in the increase of the construction and the indices of increase of the construction costs, in order to identify factors hindering development of the industry and eventual overheating risks in a timely manner, as well as forecasting the production scope and costs in the next years by applying forecasting methods. The survey reveals that during the whole period from 2020 to 2024 the experts and combined forecasts predict further increase of the industry costs. During the period from 2020 to 2022 this increase could be estimated within the a range of 1% to 5% per year, and in 2024 it could achieve 6%. According to the forecast the biggest increase of

costs relates to labour costs where the combined forecast predicts a general increase of 8% to 10% per year over the period from 2020 to 2024. As regards sub-fields, in 2020 a decrease of the industry costs is predicted in the construction of residential and non-residential buildings, as well as in the construction of roads and highways.

In Latvia, the construction of public buildings, the development of new production, infrastructure and logistics sites has great potential over the next decade. More than half of Latvia's residents live in the residential homes of the former Soviet Union, which require reconstruction projects, while focusing on new jobs in development centres and Riga suborb will also build many new buildings.The architecture and civil engineering industry has experienced very fast development as from 2017. Its growth amounted to 19.4% in 2017 and to 21.9% in 2018; construction volumes increased in all the core groups of construction during the last year. Both availability of the EU funding and private investment encourage the industry growth. Attraction of employees in the industry has restarted since 2018, the number of employees was 74.6 thousand last year accounting for 30% increase compared to 2010, however, the pace of the growth was lagging behind that of the production growth. The wages of employees have increased considerably in the industry during the last two years and last year they amounted to 94.6% of the mean wage in the national economy.

The study courses of the **PhD study programme "Heat, Gas and Water Technology"** provide basic knowledge, that builds a certain degree of culture and intelligence, enabling the students to be involved in research, pedagogical and social work, as well as to communicate with scientists.

The PhD study programme "Heat, Gas and Water Technology" focuses on the inclusion of the issues related to building engineering systems and urban infrastructure systems in the study courses.

It should be noted that the programme defines a number of specialisation areas – Building Thermal Physics, Energy Efficiency, Heat Supply, Heating, Cooling and Refrigeration, Gas Supply, Water Supply and Sewerage, Air Conditioning, Renewable Energy Sources, etc. In each of them, the academic staff shall include the latest results of their scientific research, which have been presented in publications indexed in the databases (https://www-scopus-com.resursi.rtu.lv/), as well as the findings of research carried out elsewhere in the world.

The curriculum of the study courses is updated in line with the development of the construction sector, the heat, gas and water sub-sector, labour market requirements, recommendations of the study field council, etc.

The scientific adviser of the PhD student plays the key role in achieving the learning outcomes of the study programme. The appointment of a scientific adviser is governed by the Regulations for Doctoral Studies approved by the RTU Senate (https://www.rtu.lv/lv/studijas/doktora-lieman-studies). Upon commencing of the PhD studies, a scientific adviser of the PhD Thesis supported by the Department of Doctoral Studies shall be approved by an order of the Vice-Rector for Research of RTU. The scientific adviser of the PhD Thesis holds a degree of Doctor Habilitus or Doctor of Science and actively participates in scientific research in the respective scientific field or sub-field, which is attested by publications and expert status at the Latvian Council of Science. New scientific advisers of the PhD Theses need a recommendation from the relevant Board of the Institute or the Faculty Council. The scientific adviser of the PhD Thesis may be changed. The change and approval of the scientific adviser of the PhD Thesis shall be made on the basis of a decision of the Board of the Institute or of the Faculty Council, which is submitted to the Department of Doctoral Studies. In case of disputes, the change of the scientific adviser of the PhD Thesis shall be approved by the RTU Scientific Council.

The degree of Doctor of Science (Ph.D.) *in the sub-sectors of civil engineering and transportation*

engineering: heat, gas and water engineering systems, in other sub-sectors of civil engineering and transportation engineering; or *in the sub-sectors of environmental engineering and power engineering*: thermal energy, other environmental engineering and power engineering sub-sector is awarded to graduates of the PhD study programme "Heat, Gas and Water Technology", if the following requirements have been fulfilled:

- A Thesis has been developed and successfully defended;
- All study courses of the study programme have been completed;
- At least one peer-reviewed scientific publication is published in a journal indexed in SCOPUS database with the calculated Source Normalized Impact per Paper (SNIP)) or indexed in Web of Science database with the calculated Impact Factor (IP);
- Peer-reviewed scientific publications are published in scientific journals or conference proceedings indexed in SCOPUS or Web of Science databases;
- Research results have been verified at the international scientific conferences or workshops;
- Up-to-date data analysis and processing techniques have been applied during the research.

When analysing the employment of graduates, it should be noted that they are mainly employed in private companies, municipal development departments and construction boards, design companies, public administrations and other sector-related organisations. These include A/S Rīgas Siltums, A/S Salaspils Siltums, SIA Rigas Ūdens, SIA Valmieras Ūdens, A/S Gaso, A/S Conexus, SIA Bior etc. However, part remains teaching staff or scientific staff in our structure.

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

The number of PhD students enrolled in **the PhD study programme "Heat, Gas and Water Technology"** and the number of students studying at the programme in the reporting period is given in Figure 1, Annex 5. No foreign students have been counted on the doctoral curriculum since their previous accreditation, consequently, no statistics are available.

The changes in the number of students are explained by:

- The changing number of Master's studies graduates;
- Changes in the financial support to PhD students;
- Pace of development of the national economy.

Number of students: As of April 2021, the total number of students at the PhD programme "Heat, Gas and Water Technology" was 27 students, only by 18 % less than in 2017 (33 students). In view of the statistics of recent years concerning the number of students enrolled, it can be argued that the number of students is declining insignificantly. For more information on the distribution of students, see Annex 5, Figure 1.

Number of alumni: In academic year 2020/2021, 1 Doctor of Engineering Sciences degree (Ph.D.) was granted, no Doctoral degree was granted in academic year 2019/2020, 4 graduates were granted a degree of Doctor of Engineering Sciences in academic year 2018/2019, no Doctoral degree was granted in academic year 2017/2018, 5 graduates were granted a degree of Doctor of Engineering Sciences in academic year 2016/2017 (see Annex 5, Figure 2).

Drop-out: For a variety of reasons, students were expelled: 6 PhD students were expelled in academic year 2019/2020; 10 PhD students – in 2018/2019; no PhD students were expelled in 2017/2018; 8 PhD students were expelled in 2016/2017. Expelled as PhD candidates: 2016/2017 – 3 PhD candidates; 2018/2019 – 5 PhD candidates; 2019/2020 – 3 and 2020/2021 – 2 PhD candidates. For precise comparison of PhD student dropout in each academic year, see Annex 5, Figure 3.

The main reasons for student dropout:

- students are not able to pass study courses, for example, in academic year 2016/17, 1 out of 8 students was expelled for academic failure, in 2019/2020 2 out of 6 students were expelled for this reason;
- students drop out of higher education institution due to social causes/family conditions and do not resume studies after academic leave; the number of students varies from 1-4 students during the reporting period;

In the reporting period, 12 Doctoral Theses were defended:

1. “Determination of Erosion Time at Water-Taking Structures in River Flood-Lands”, Scietific adviser: Professor B. Gjunsburg. Defence was held on 2 November 2016.
2. “Photovoltaic Solar Air Conditioning”, Scietific adviser: Professor P.Šipkovs. Defence was held on 2 November 2016.
3. “Biological Stability in Chlorinated Drinking Water Distribution Networks”, Scietific advisers: Professor T.Juhna, Dr. F.Hammes. Defence was held on 16 June 2017.
4. “Safety Assessment of the Natural Gas Supply System” Scietific adviser: Professor N.Zeltiņš. Defence was held on 18 January 2017.
5. “Assessment of Scenarios for the Development of District Heating Systems”, Scietific adviser: A. Borodiņecs. Defence was held 18 January 2017.
6. “Ferromagnetic Sorbents for Collection and Utilization of Oil Products”, Scietific adviser: Prof. V. Mironovs, Assoc. Prof. E. Teirumnieks. Defence was held on 8 June 2018.
7. “Energy Efficiency Assessment of Residential Building Hot Water Systems”, Scietific adviser: Dr.sc.ing. Aldis Greķis. Defence was held on 13 December 2018.
8. “Methods for the Management and Control of the District Heating System”, Scietific advisers: Prof. E.Dzelzītis, Prof. A.Kološkins. Defence was held on 13 December 2018.
9. “Online Monitoring for Drinking Water Quality,” Scietific advisers: Jānis Rubulis, Tālis Juhna. Defence was held on 13 December 2018.
10. “Use of Microscopic Mushrooms in the Purification of Municipal Waste Water from Pharmaceutical Active Substances”, Scietific advisers: Tālis Juhna, Gunaratna Kuttuva Rajarao. Defence was held on 26 march 2021.
11. “Long-term assessment methodology of building stock thermal energy consumption” Scietific adviser Anatolijs Borodiņecs. Defence was held on 28.05.2021.
12. “Simulation model for cooling panels with integrated latent thermal storage system”, Scietific adviser Arturs Lešinkis. Defence was held on 3.09.2021.

PhD students actively participate in the study process as academic staff members, and through their pedagogical activities improve existing courses within Bachelor and Master study programmes

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

3.2. The Content of Studies and Implementation Thereof

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

The content of **the PhD study programme "Heat, Gas and Water Technology"** complies to legal requirements of the Republic of Latvia, internal RTU regulations, RTU and the Faculty of Civil Engineering (FCE) strategies, as well as supports the achievement of Sustainable Development Goals (SDGs). The programme is in Latvian and English. Both forms have no content differences, exept in accordance with the decision of the RTU Senate of 26 November 2018, the Latvian language course is compulsory for foreign students in addition to the study programme content (VSL711 Latvian Language for Foreign Students). Depending on the field of science of planned doctoral work , the student chooses from Restricted Choice Studies courses 21CP volume courses that match with the topic.

The first year of studies (total 48 CP):

- compulsory study courses in the volume of 15 CP - "Advanced Solutions in Energetics" (5 CP). Within the study course, students acquire knowledge about contemporary energy problems. The next compulsory study course is "Automatic Control of Heat, Gas and Water Technological Systems" (10 CP). Within the study course, students acquire knowledge and skills necessary for planning energy-supply automation systems.

- Compulsory elective study courses (15 CP).

- Research work (18 CP) is carried out in cooperation with a scientific supervisor of the thesis. At the end of the first year of studies, at least one publication is prepared and submitted, a conference paper is prepared and presented at an international conference.

The second year of studies (48 CP):

- Compulsory elective study courses in the volume of 3 CP "Specialised Research Seminars". Within the study course, students acquire the skills to critically evaluate, review, and edit scientific articles as well as acquire the presentation skills. In addition, attention is paid to the methods of obtaining and analysing information, presentation of research results, assessing

their objectivity and preparing materials for publication.
- Research Work (39 CP) takes place in cooperation with the scientific adviser of the Doctoral Thesis. At the end of the second year of studies, at least two publications and reports at international conferences shall be published. The Thesis must be 30% ready.

The third year of studies (48 CP):

- Research work (48 CP) is devoted to research, publishing research results, participation in experience exchange and mobility projects. In the process, individual work of the PhD student is becoming more and more important. There is ongoing work related to scientific publications (at least 2 publications should be developed and submitted for publication), international cooperation is being developed. The Thesis must be 75% ready.

The fourth year of studies (48 CP):

Research work (48 CP). The thesis-related research comes to its end. A PhD student presents the Thesis for pre- defence to the committee that is to include the members of RTU Doctoral Council P-12, the Thesis supervisor, PhD students, etc. During the pre-defence, the research results are analysed, recommendations on the Thesis improvements are given and the decision on whether the Thesis can be submitted for the Thesis Viva Voce procedure or should be amended is taken. It must be noted that not all PhD students can fulfil stringent requirements within the planned schedule of studies. Along with that a part of the PhD students use the opportunity to take a sabbatical leave.

In the reporting period, an average term of Thesis development within the RTU PhD programme “Heat, Gas and Water Technology” exceeded 4 years. From 2019 to 2021, the reconstruction of the building of the Faculty of Civil Engineering has been carried out, and as the result a modern building and new laboratory facilities will be built.

It is essential to improve and ensure a stimulating research environment for the researchers, so currently the faculty is trying to improve the research environment:

- Establishing and maintaining partnership or similar activities in the research community upon completion of the academic or PhD studies;
- Providing internationally recognized research process, taking into account a growing number of publications, research projects, conferences, etc.;
- Providing effective research infrastructure, making contributions to development of a high-quality research infrastructure and ensuring comprehensive resources for research activities;
- Providing sustainable innovations, commercialization and technology transfer, promoting interdisciplinary knowledge and technology creation, by establishing and maintaining international research partnership;
- Enhancing internal and external communications and cooperation.

Each study course responiseble staff shall be an expert on the sector. This is confirmed by both the status of the expert in the Latvian Academy of Sciences and participation in EU and Latvian research projects. Participation in EU projects and regular reviews of articles allows the sector to be followed up.

A Doctoral degree (PhD.) in the field of “Civil and Transportation Engineering” or "Environmental Engineering and Energy"; or "Environmental Biotechnology" is awarded to the graduates of the PhD programme “Heat, Gas and Water technology” if the following requirements have been fulfilled:

- A Thesis has been developed and successfully defended;
- All study courses of the study programme have been completed;
- At least one peer-reviewed scientific publication is published in a journal indexed in SCOPUS

database with the calculated Source Normalized Impact per Paper (SNIP)) or indexed in Web of Science database with the calculated Impact Factor (IP);
- Peer-reviewed scientific publications are published in scientific journals or conference proceedings indexed in SCOPUS or Web of Science databases;
- Research results have been verified at the international scientific conferences or workshops;
- Up-to-date data analysis and processing techniques have been applied during the research.

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

The programme "Heat, Gas and Water Technology" has defined in the following areas of scientific research, which are directly related to the study courses to be implemented:

Research area	(%)
Low-energy buildings	25
Building engineering systems	25
Urban energy supply	25
Urban water supply	25

Themes for theoretical works and practical tasks within the study programme are regularly related to the topicalities of the sector. The results of research and creative works are regularly reflected in scientific journals and conference proceedings.

Every year the academic staff of the Faculty of Civil Engineering publishes dozens of articles in various local and international scientific journals and deliver more than 20 reports at local and international scientific conferences. The variety of themes illustrates the broad spectrum of interests ensuring the informative and creative diversity of teaching work.

Students of the PhD programme "Heat, Gas and Water Technology" are given the opportunity to specialise in one of the research areas in the field of heat, gas and water technology:

- Low energy buildings and building thermal physics (Prof. A. Borodiņecs)
- Research of the building humidity transfer processes (Dr.sc.ing. J. Zemītis)
- Optimising energy consumption of heating, ventilation and air conditioning systems (prof. A. Lešinskis)
- Development of a structure of the management levels of Building Automation Systems (BAS) (prof. E. Dzelzītis)
- Use of alternative energy sources in the building energy supply of (Assist. prof. L. Migla)
- Regional development of heating and gas systems (Assist. prof. I. Laube)
- Biological stability and biofilm controle in drinking water supply systems (Prof. T. Juhna)
- Movement of erosion and silts in open beds and sewer systems (Prof. B. Gjunsburgs)
- Risk assessment for water supply systems (Assoc. prof. J. Rubulis)
- Use of agricultural waste for the production of biofuels (Assoc. prof. L. Mežule)
- Use of bioreactors in water and waste water treatment systems (Assoc. prof. K. Tihomirova)

A large specific share of PhD programmes in dedicated to individual PhD student work. At the same time, throughout programme implementation, students successively acquire knowledge, skills and competences.

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

The **PhD study programme "Heat, Gas and Water Technology"** is devised ensuring an integrated development of knowledge, skills and competences that is based on the individual and group research work, continuous communication among PhD students and scientific supervisors.

According to the Resolution of RTU Senate of 29 March 2010 "Regulation on the Assessment of Learning Outcomes", the Resolution of RTU Senate of 25 May 2001 "On Criteria of Assessment of Learning Outcomes" and Resolution of RTU Senate of 29 January 2001 "On Transition to a United System of Assessment of Learning Outcomes", academic results at RTU are evaluated according 10-grade scale (10 – with distinction, 1 – very very poor). Forms of assessment include credit tests, term papers and exams in accordance with the study plans approved for each academic year.

At the end of each academic year (May–June), the Scientific Committee of the faculties shall carry out attestation of Doctoral students. The time of the attestation meeting shall be appointed by the Deputy Dean for Research of the Faculty of Civil Engineerig on an individual basis. During the attestation meeting in which all PhD students of the Faculty participate, the performance of the PhD student's work plan shall be evaluated, taking into account the minimum requirements specified in the Regulations of Doctoral Studies for the preparation of publications and the development of the PhD Thesis.

PhD students shall be transferred in the following year of study on the basis of a decision of the Scientific Committee of the Faculty. A PhD student who has not fulfilled the specified minimum attestation requirements shall be expelled from the PhD study programme.

In the fourth year of study, the PhD student shall be attested as having successfully completed the studies and expelled as a PhD candidate if, at the end of the study period, the PhD student has submitted the PhD Thesis to the Doctoral Council "RTU P-12", or the pre-defence of the draft of the PhD Thesis has taken place at the meeting of the Doctoral Council, or at the meeting of the organisational unit in which the Chair of the Doctoral Council, the Deputy Chair, or an appointed industry expert participated, and a recommendation has been received to submit the PhD Thesis to the Doctoral Council. Otherwise, at the end of the fourth year of studies, the PhD student shall be expelled from RTU for academic failure.

Further, in addition to the subject of doctoral thesis, it is proposed to obtain a degree in one of the three fields of science. If work-oriented on engineering systems, constructive solutions, the student can defend in *construction and transport engineering* field, if the work involves energy efficiency, energy savings, heating solutions, environmental impacts, water quality, then the student defend

the work in the field of *environmental engineering and energy*, while if the work is focused on determining and eliminating water pollution, then the work is defended in the field of *environmental biotechnology*.

Public presentation of the PhD Thesis shall take place in accordance with the Cabinet of Ministers Regulation No. 1001 (27/12/2005) "Procedures and Criteria for Awarding a Doctoral Degree".

The PhD study programme "Heat Gas and Water Technology" respects the principles of student-centred teaching and studying. The methods used in the course of the studies shall contribute to the achievement of the objectives and results learning outcomes of study courses and programme. Students have the opportunity to influence their studies, exercise their autonomy, provide feedback on the study process by matching their expectations. It should be noted that the RTU Code of Academic Integrity, the Regulations on the Assessment of Learning Outcomes, the Guidelines for the Development of Study and Graduate Papers, etc., define teaching and study guidelines.

The PhD study programme with a large share of individual work, which respects the differences among the students taking into account academic background and experience of each student, as well as research activities, very well meets the principles of student-centred learning. It allows concluding that the courses within the study programme are student-centred. Implementation of the study programme is carried out using different modes of the study course implementation. Students work in small groups, but at senior courses - through individual work, which allows applying appropriate and diversified pedagogical approaches. The study process is organized in the way to encourage the autonomy of PhD students, simultaneously providing support to the member of the academic staff in their capacity of scientific supervisor a mentor.

Implementation of the internal education quality assurance system at RTU is ensured at the following levels:

At the level of the Office of Vice-Rector for Academic Affairs, internal education quality assurance is performed by the Study Department, which:

- provides operations and control of RTU Study Course (SC) Register, monitoring whether the study course correspond to the requirements of the respective tertiary education program and its content;
- surveys students at the university level to discover how successfully first year students have adapted to the university system, to find out the level of student satisfaction with the study process, lectures, practical classes and academic staff, as well as ensures that survey results are available to RTU Study Department, each member of academic staff, heads of departments, Deputy Dean for Studies and a responsible person at the Office of Vice-Rector for Academic Affairs;
- ensures relevant premises and technical support to general lectures (100 – 200 seats).

RTU regularly monitors development of academic personnel. Courses and seminars are regularly organised for academic personnel, both on pedagogical methods and on technological possibilities for improving the quality of courses and their own qualifications. RTU regulations stipulate that a member of academic staff should also deliver guest lectures at foreign universities, which also directly increases their abilities and the quality of communication. In 2021, RTU organised the following training for the personnel - training on the e-learning environment (Moodle), use of Zoom and Teams (which significantly increased the mobility of teaching staff due to the epidemiological situation), training on audio-visual systems for remote lectures, as well as regular trainings on RTU information systems (usage of ortus.lv). Any other type of training for elected academic personnel in their field is also supported.

At the level of RTU faculties:

- once a year, the head of the study programme submits a report to the Council of the faculty, prior to that assessing and ensuring the relevance of the study program at the Faculty Study Field Commission;
- student self-government is involved in the overall quality assurance process of the study program. Representatives of the student self-government actively participate in work of decision-making bodies: RTU Academic Assembly, RTU Senate, RTU Senate Commissions and Faculty Council.

At the department level:

- each semester the administration of the study programme analyses the results of the student survey on the quality of academic staff performance and overall assessment of the study program. The results are discussed at the department meetings, meetings of the Faculty Study Field Commission and Faculty Council meetings;
- once per academic year annotations to the study course within the study program, course syllabi, methodological resources, the list of literature and the guidelines for development of the course works (reports, papers, internship reports and graduate papers) are reviewed;
- courses and seminars for faculty members are regularly organized to address such issues as the newest teaching and pedagogical methods. Members of academic personnel are motivated to attend qualification advancement courses;
- academic personnel and administration of the study program participate in various experience exchange activities, cooperating with universities from other countries, meeting representatives of the industry and entrepreneurs, discussing topical industry issues and student research work and projects;
- departments continuously monitor that the quality of the premises and equipment meets quality requirements and update the resources as necessary.

Additional quality assurance system accounting for the specifics of the study field is implemented within the study programme:

- regular monitoring of student individual performance (responsible authority – academic staff);
- regular reporting of performance results in the RTU Study Management System (responsible authority – faculty record management department);
- regular monitoring of the study program implementation process (responsible authority – program administration);
- regular discussion with the student self-government and program administration on the detected drawbacks and risks related to the study process (responsible authority – student self-government);
- regular updating individual courses and themes accounting for the newest discoveries and trends in the research field (responsible authority – Faculty Study Program Council);
- arbitration mechanism (responsible authority – program administration).

Learning outcomes for each study course are defined separately and are included in the study course description, which are published in RTU Study Course Catalogue.

Examination and credit test questions are prepared by the instructor responsible for the study course based on the approved description of the study course and the study program. Examination questions are formulated to ensure that a student is capable to comprehensively answer them thus demonstrating that they have fully covered course content. Tests are carried out in accordance with the requirements stipulated in effective RTU regulations.

Examinations set by the program allow making sound conclusions about the level of knowledge and skills of each student assessing their progress in the long term. In order to improve student

academic performance and raise their interest in acquiring comprehensive knowledge, FCE runs an annual competition among the students for the opportunity to continue studies on the state budget funds. The only criterion that is taken into consideration is student's academic performance in the previous period.

Assessment of student advancement and their performance is conducted through the entire period of program implementation. At the seminar's students submit their works to the instructor and develop their presentation skills and competences. Tests envisioned by the program allow making sound conclusions about the level of knowledge and skills of each student assessing their progress in the long term. Presentations of course papers are public and are aimed at developing students' discussion skills.

The study programme meets the requirements of RTU Regulation on Doctoral Studies. In the course of studies, the aim of the PhD programme "Heat, Gas and Water Technology" is achieved – education and training of the specialists with advanced qualification in research and tuition in civil engineering or compatible fields for individual research work and management, which refers to Level 8 of the European Qualifications Framework (EQF) and Latvian Qualifications Framework (LQF). Doctoral studies are planned for 4 years, divided into 8 study semesters. The duration of full-time studies is 4 years (48 weeks x 4 = 192 weeks). The amount of studies in doctoral studies is 192 CP (1 CP / week x 192 weeks). The volume of the study program and the total duration of studies are the same for students with different previously acquired education: 192 CP - for full-time studies.

A Compulsory study courses (all students) - 15 CP.

B Limited choice study courses (depending on the selected science field) 21 CP

C Free Choice study Courses 6 CP

E Research work 150 CP

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

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

The promotion procedure is determined by the Regulations on Promotion Councils and Promotion at RTU. The promotion at RTU is allowed for the scientific domains, which are accredited for Doctoral study programmes in accordance with the Regulations of the Cabinet of Ministers No. 1000. At

present, 19 Promotion Councils operate at RTU being entitled to confer a scientific degree in architecture, civil engineering, electronics and telecommunications, electrical engineering, power engineering, information technologies, chemistry, chemical engineering, mechanical engineering, materials science, mechanics, transport and communication, management and environmental science.

The Promotion Councils confer the PhD degree for an independently developed and publicly defended promotion work under the supervision of an experienced scientist (a professor, an associate professor, an assistant professor and/or the leading researcher, who is approved in accordance with the procedure determined at RTU).

The promotion work may be a Doctoral Thesis, or a thematically united series of scientific publications, or a monograph – a refereed scientific book, which is dedicated to one subject.

For a PhD student, qualitative Doctoral Studies are completed with passing of all examinations and tests anticipated by the Doctoral Studies work plan, submission of the promotion work for defence of the PhD degree at the Promotion Council of the corresponding industry, public defence of the promotion work and obtaining the PhD degree.

The first stage on the way to obtaining the PhD degree is completed when a PhD student successfully passes all examinations and tests anticipated by the Doctoral Studies work plan, as well as develops his/her promotion work.

The second stage is submission of the promotion work to the Promotion Council of the corresponding industry for public defence. A structural unit of RTU, where the promotion work is developed, makes a decision at a meeting that the promotion work has been developed and is to be submitted to the Promotion Council of the corresponding industry. A candidate for the scientific degree submits an excerpt from the meeting proceedings together with other required documents (in accordance with the Regulations on Promotion Councils and Promotion at RTU) to the Promotion Council of the corresponding industry.

At **the third stage** the Promotion Council accepts the promotion work, when its author substantiates his/her choice of the subject, defines the goal and objectives of his/her research, characterises scientific achievements during the research of the subject and the used methods, reports on and discusses the results obtained in the work and conclusions, summarising these in the conclusions and the theses to be defended.

Not later than two weeks prior to the promotion work defence date determined by the Promotion Council, the PhD candidate, who has been already dismissed from the Doctoral Studies due to completion of the theoretical course, submits an application addressed to RTU Vice-Rector for Research for his/her reinstatement at Doctoral Studies to the Doctoral Studies Department; Places the promotion work, its summary (in Latvian and English) and the promotion work appendices in the electronic form on the ORTUS portal; Submits one copy of the promotion work and its summary (in Latvian and English) to the RTU library; Submits two copies of the promotion work and seven copies of its summary (in Latvian and English) to the National Library of Latvia.

Notices on submission of the promotion work and its summary to the libraries must be submitted to the Promotion Council Secretary prior to the defence.

The fourth stage is defence of the promotion work. The Regulations on Promotion Councils and Promotion at RTU provide information regarding the process of public defence of a promotion work and conferring the scientific degree.

The PhD degree is conferred to the candidate pursuant to the resolution of the Promotion Council, with the order of RTU Rector.

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

When commencing PhD studies at the **PhD study programme "Heat, Gas and Water Technology"**, the theme of the Thesis is formulated for a PhD student, addressing a vital issue in the field of heat, gas and water technology. Thus, the Director of the programme advises on a potential Thesis supervisor, who is approved by the decision of RTU Vice-Rector for Academic Affairs. Since in the course of research work a broader scope of issues than it was previously planned can be possibly covered, the theme of the Thesis can be reformulated before the Thesis Viva Voce Examination.

In the reporting period, the themes of all 10 defended theses have been internationally focused. Their themes are not only related to civil engineering but also contribute, for example, to the development of district heating systems, by integrating renewable energy sources and by reducing the amount of CO_2 emissions from heat sources, as well as to the quality of drinking water in distribution networks and to reducing the environmental impact of sewage.

The developed study programme is oriented at those issues, as its goal is to educate and train internationally competitive higher qualification specialists for academic and research work at universities, R&D centres, as well as for organisational work at state and private institutions. Thesis evaluation procedure according to the Cabinet regulations No. 1001 ""The procedure and criteria for awarding of a Doctoral degree"" of 27 December 2005, performed by the Doctoral Council, reviews by three experts and public Viva Voce of the Thesis provide interconnection between the PhD programme outcomes and their reachability.

Alumni of the PhD programme "Heat, Gas and Water Technology" have carried out research in CFE specified fields of research: water supply and purification, regional development and research into heat, water and gas systems, engineering structures, calculation and modelling thereof, design of different engineering systems, research on construction physics, technical monitoring, etc.

By training highly qualified scientists who carry out innovative research and continue working at universities both in Latvia and abroad, the PhD programme "Heat, Gas and Water Technology" contributes significantly to achievement of UN sustainable development goals. For us, as for a university, **Item 4.c of goal 4** "**Provide inclusive and qualitative education and promote life-long learning opportunities" is most essential:** "To increase substantially the number of qualified members of academic staff during the period until 2030, amongst others by holding international cooperation events for training of academic staff in the developing countries and in particular in the least developed countries", which is implemented directly involving the academic staff and students of the study programme.

3.3. Resources and Provision of the Study Programme

3.3.1. Assessment of the compliance of the resources and provision (study provision, scientific support (if applicable), informative provision (including libraries), material and

technical provision, and financial provision) with the conditions for the implementation of the study programme and the learning outcomes to be achieved by providing the respective examples.

RTU Faculty of Civil Engineering (FCE) continuously monitors compliance to quality requirements of rooms and technical equipment, the appropriate lecture halls with necessary multimedia hardware have been equipped. In general, in the FCE building at 6A Ķīpsalas Street 4 computer rooms, 23 lecture rooms, 35 laboratory rooms are available for the needs of the study process. In order to ensure the qualitative study process, FCE is carrying out extensive refurbishment works, upon their completion the Faculty will meet international standards for campuses and lecture halls. Classification of the premises is given in the table below.

Room type	Number of rooms	Useful area m²
Meeting room	1	70.91
Computer rooms	4	243.77
Auditoriums	23	1702.34
Teachers' rooms, cabinets	69	1523.61
Assistant professor / Doctoral student premises	5	196.24
Workspace / workshop	6	172.19
Research facilities	6	350.53
Laboratories	35	1256.83
Resource room	6	213.53
Auxiliary room	11	197.99
Anteroom	3	35.89
Student self-government and record keeping	3	260.43
Kitchen	1	16.43
Total		**6240.69**

Of these, the following facilities shall be provided for the Institute of Heat, Gas and Water Technology:

Way of using premises	Number of premises	Useful area m ²
Laboratory – simulator	1	66.43
Laboratory – heating and renewable systems	1	68.05
Venting laboratory	2	70.3
Resource room/ doctoral candidate room	1	32.95
Employee room	6	95,04
Meeting room/on-line lecture room	1	32.61
Computer class/classroom	1	66.95
Laboratory – water system	1	70.91
Offices	1	15.67
Total		**337.29**

The research base consists of the existing FCE laboratories, databases, various software, as well as ample RTU scientific resources. Different research needs are met with modern world-class equipment and laboratories. In 2017 – 2020, substantial investments were made in the research infrastructure.

PhD students at the programme “Heat, Gas and Water Technology” can carry out their scientific research not only using the equipment if the Institute, but also equipment listed at the “UseScience” portal. RTU hosts the research equipment and service portal “UseScience” for research institutions, students, entrepreneurs and other stakeholders, partner institutions and industrial companies in Latvia and abroad. The portal offers an opportunity to contact a person, responsible for a certain equipment, and agree on a service or equipment lease. RTU concluded cooperation agreements with other research institutions about the use of research equipment; it is possible also for commercial companies, if financial conditions allow this.

RTU research department manages Research Support Fund, which provides support to research activities, ensures research infrastructure maintenance and accessibility, as well as grants financial support to publications in Open Access Journals and through open publishing of RTU scientific articles.

The Scientific Library of RTU (https://www.rtu.lv/en/studies/scientific-library) is an academic library of state significance, which has obtained its status as a result of library accreditation. The Scientific Library of RTU provides the necessary information for RTU study process and research activities, performs library, bibliographic and information services for RTU students, teaching staff, and employees. The Library's collection includes 1.4 million printed documents and e-resources in the databases relevant to RTU fields.

In 2016, significant investment was made in the development of the library infrastructure, with the construction of an additional 2240 m2 of space for the Central Library. The total area of the library premises is 6393 m2, of which 3417 m2 are for reader services. There are 713 workstations for library users. The library has four group rooms and six individual cubicles, a Western reading room and a conference room. The library is accessible to users with reduced mobility.

To improve the work of the Scientific Library of RTU and to ensure the availability of information

needed for study and research work, the Library Council has been established, which decides on the replenishment of the library's collection with printed publications and subscriptions to the necessary databases. The Library Council has approved the "*RTU SL Collection Completion Policy*", which defines the basic principles of collection formation and development in accordance with the directions of RTU study and scientific activities.

When RTU provides funding for the library, the funding for information resources for each study programme is calculated. The collection is replenished according to the recommendations of the heads of study programme, researchers, and the allocated funding. The desired titles can be ordered by contacting the Library's Collection Development Department, ordering on the Library's website, filling in the order form, filling in the application form, by phone or by visiting the Library. The Scientific Library offers a guide to ordering titles and e-resources, which brings together the websites of various publishers and bookshops in Latvia and abroad.

Database subscription contracts are concluded both directly with the supplier and through the "Cultural Information Systems Centre" state agency, which is the Latvian national representative of the international non-profit organisation EIFL (*Electronic Information for Libraries*, http://www.eifl.net/). The EIFL Licensing Programme offers national libraries subscriptions to internationally recognised databases at significantly reduced subscription fees not offered to individual subscribers, thus saving financial resources of the libraries.

The database subscriptions maintained by RTU Scientific Library

(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.
- Databases financed by the Ministry of Education and Science available to RTU Scientific Library: ScienceDirect, SCOPUS (Elsevier), Web of Science.
- Latvian databases: LETA, Letonika, the Database of Latvian Standards (available on the premises of the Library).

Database usage at the Scientific Library of RTU has been growing since 2016. E-resource loans have increased from 75,391 to 525,194 items.

The new library premises have allowed to extend the range of services. Since the opening of the new premises in 2018, the number of visits to the library has increased from 103,825 to 235,600. The Scientific Library of RTU is open to everyone. The Central Library is open to users from Monday to Saturday. There is a 24/7 reading room. During the summer period, the Central Library is open every weekday with reduced opening hours. (https://www.rtu.lv/lv/studijas/biblioteka/pakalpojumi-3) (in Latvian).

The library's sources are housed in an open-access collection. Books and periodicals according to the field of study and the UDC indexes are located in the central building of the Scientific Library, 5 Paula Valdena Street, Riga. The last copies of the oldest publications corresponding to the RTU profile are kept in the library repository. They are always available to the users.

The librarian on duty helps visitors find their way around the collection. Bibliographers (information specialists) provide more detailed information and advice. The library has a branch librarian service. (https://www.rtu.lv/lv/studijas/biblioteka/nozaru-informacija). (In Latvian)

The library resource search is supported by the Primo Discovery search tool (https://www.rtu.lv/lv/studijas/biblioteka/vienota-informacijas-meklesana)(in Latvian). It allows

searching the library catalogue (https://kopkatalogs.lv/F/LQEKF66V867LGCESXM4LJKH2R5HXIX7R5HLG3CA133S8LMVY8T-10950?func=option-update-lng&P_CON_LNG=ENG), the subscribed databases, as well as databases created by the RTU Scientific Library (https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/bibliotekas-veidotas-datubazes) (in Latvian) in one interface. Searching for information in the electronic joint catalogue (https://kopkatalogs.lv/F/LQEKF66V867LGCESXM4LJKH2R5HXIX7R5HLG3CA133S8LMVY8T-11933?func=option-update-lng&P_CON_LNG=ENG), it is possible to simultaneously obtain information on the resources available in 12 Latvian libraries. Both the electronic catalogue and the RTU portal ORTUS allow remote reservation of library resources, as well as remote access to the databases. Since the introduction of RFID technology, users can use five self-service book-dispensing machines and check out books from the pick-up machines around the clock.

The library provides students, academic personnel and other stakeholders with various levels of individual consultations and group training in information literacy (https://www.rtu.lv/lv/studijas/biblioteka/lietotaju-apmacibas) (in Latvian).

Publications not available in the library are delivered via an interlibrary loan or an international loan.

Internet access is available throughout the library. The library has copying, scanning, printing, binding services and a self-service dining room.

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

At the domestic scale, the most significant partner in implementation of the PhD programme “Heat, Gas and Water Technology” is Latvia University of Life Sciences and Technologies. This is proved by participation of RTU FCE academic staff in the work of the Doctoral Council in Civil Engineering of LULST, in organization of scientific conferences and workshops.

The following universities may be mentioned as the most significant foreign partners in implementation of the PhD programme: Vilnius Gediminas Technical University (Lithuania), Kaunas Technical University (Lithuania), Tallinn University of Technology (Estonia), Brno University of Technology (Czechia), Palermo University (Italy). There are positive trends in communications with the University of Padua (Italy), etc.

Research and information resources are used jointly by all partner high schools, knowledge and experience exchange is provided, summer schools, intensive study programmes, PhD student and/or academic staff internship, projects, joint publications and other activities are being implemented.

3.3.3. Indicate data on the available funding for the corresponding study programme, its funding sources and their use for the development of the study programme. Provide information on the costs per one student within this study programme, indicating the items included in the cost calculation and the percentage distribution of funding between

the specified items. The minimum number of students in the study programme in order to ensure the profitability of the study programme (indicating separately the information on each language, type and form of the study programme implementation).

The PhD programme “Heat, Gas and Water Technology” is funded both by state budget and from foreign tuition fees from physical entities. The number of state budget funded seats at the PhD programme is regulated by the annual agreement between RTU and the Ministry of Education and Scince, thus the number of seats at the programme changes on the annual basis.

The specific development of each study programme is the responsibility of each study programme director, as well as the faculty responsible. For the development of all study programmes, central funding is used for the renewal of the research library, improvement and maintenance of shared classrooms, public relations, programme marketing activities, development and maintenance of information systems related to the study process, development of the Ķīpsala complex and other activities.

Tuition fees are set in line with the National Audit Office's warning that tuition fees for students studying with budget students cannot be less than the public funding for this service. Tuition fees are set taking into account a number of factors, such as the programme's ability to cover its costs, the market situation, demand for the programme, the stage of development of the programme, etc.

The dynamics of the changes in funding by the source of funding is shown in the table.

Year	Subsidy to the programme, EUR	Cost per student, EUR
2016/2017	121 896.48	11 598.06
2017/2018	106 513.97	12 121.97
2018/2019	103 050.54	12 689.04
2019/2020	183 704.09	13 215.13
2020/2021	167 889,82	13 388,43

The Cabinet of Ministers Order No. 345 of June 25, 2020 “On the Conceptual Report“ On the Introduction of a New Doctoral Model in Latvia ”states that:“ Currently, State Budget funding for one doctoral study place is from ~ 4500 to ~ 16,000 euros per year ”. Thus, it is clear that the funding allocated to the doctoral study program “Heat, Gas and Water Technology” is in the middle of this interval.

The calculation of costs includes such items as the salary of the teaching staff, the employer's mandatory state social insurance contributions per study place per year, business trip and business trip costs per study place per year, service costs per study place per year, which include communication service costs per study place per year, real estate tax on land per study place per year, repair costs per study place per year, maintenance costs per study place per year, provision of administrative work per study place per year as well as other services per study place per year per year; costs of materials, energy resources, water and inventory per one study place per year, which includes the costs of consumed electricity, heating, water supply, sewerage, purchase of teaching aids and materials per one study place per year, purchase of equipment per student per year, purchase of stationery per study place per year, purchase of books and magazines per

student per year, purchase and modernization of equipment per study place per year, social security costs of the study place.

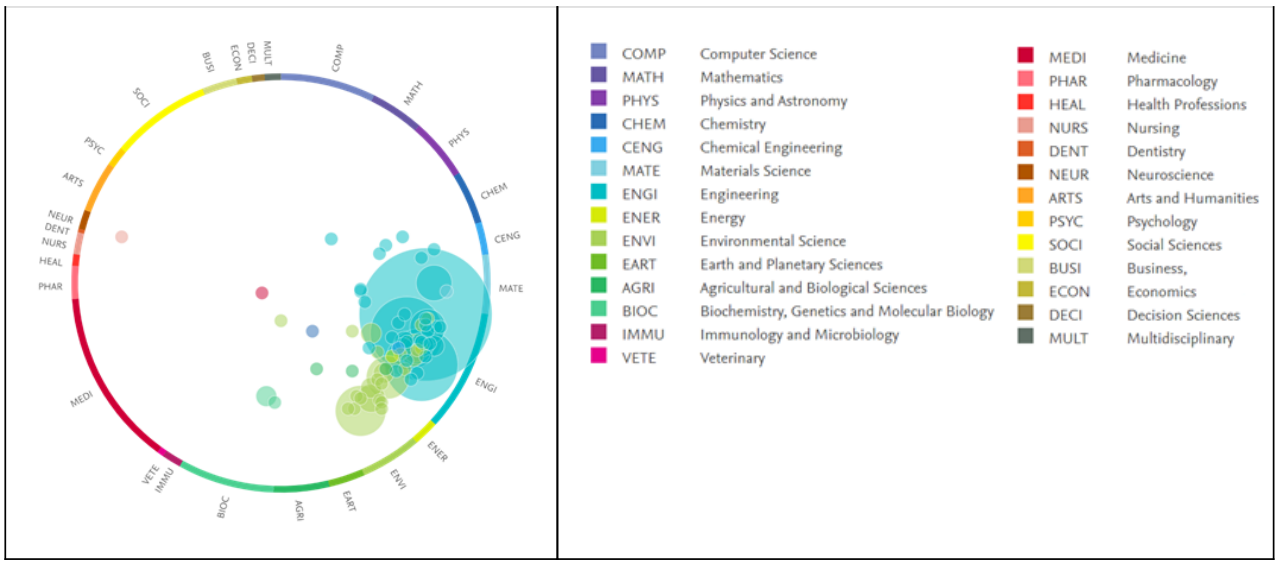
Information on the minimum number of students in RTU study programmes is provided in the appendix of the self-evaluation report "On minimal number of students in study programmes".

Information on the funding distribution between the cost items is provided in the appendix of the self-assessment report "Funding distribution between the cost items".

3.4. Teaching Staff

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

A large number of publications during the reporting period could be considered one of the most significant high-quality scientific research indicators of the PhD study programme “Heat, Gas and Water Technology”. For example, in 2015-2021, a total of 137 articles by the academic staff working at the PhD programme “Heat, Gas and Water Technology” have been published in the journals indexed in SCOPUS database, of which 51.8% are published in Open Access sources (SciVal data). Breakdown of the publications by research field is given in the chart below.



The academic staff involved in the implementation of the study programme have high qualifications and can provide comprehensive support to PhD students.

The academic person's qualifications obtained by consulting projects in the industry help to maintain the quality of studies at a modern, high level, by selecting examples for analysis in study courses and by developing the final works of study programmes.

The programme employs 4 professors – Doctors of Science, who were elected professors by the Professors' Council of Civil Engineering and whose scientific and teaching qualifications meet regulations on the criteria for evaluating scientific, teaching and organizational qualifications of the candidates for the position of a professor. The professors elected by the Professors' Council of Civil Engineering: Dr.habil.sc.ing. Egīls Dzelzītis, Dr.sc.ing. Anatolijs Borodiņecs, Dr.sc.ing. Tālis Juhna and Dr.sc.ing. Romāns Neilands.

The summaries of qualifications of RTU professors working at the PhD study programme "Heat, Gas and Water Technology" are given below:

Professor, Dr.sc.ing. Anatolijs Borodiņecs obtained a Doctoral degree in engineering from Riga Technical University in 2007. Since 2013, he has been a Professor at the Institute of Heat, Gas and Water Technology, Riga Technical University. The main research areas of Prof. Borodiņecs are energy efficiency and construction thermal physics. He is a participant and leader of several Latvian and international projects. Major recent projects: H2020 Deep nZEB Modular Retrofitting and ERDF Energy-Efficient Solutions for Unclassified Buildings. He has recently participated in INTERREG, Seventh Framework Programme projects and Horizon 2020 projects. A. Borodiņecs has been awarded FULBRIGHT scholarship for research at the Indoor Environment Center of Department of Architecture Engineering, the State University of Pennsylvania. Since 2013, he has been reviewing articles in ELSEVIER journals and has been an editorial board member of the SCOPUS-indexed journals, as well as has been participating in industry-leading international conferences. Since 2015, A. Borodiņecs has been holding REHVA FELLOW status. He is also a board member of the Latvian Association of Heating, Ventilation and Air Conditioning Engineers and a member of ASHRAE. He is a certified HVAC designer as well as an energy auditor. A. Borodiņecs is the author/co-author of 73 SCOPUS indexed publications, SCOPUS h-index is 9, Google Scholar h-index – 12. He is a Deputy Chair of the Doctoral Council "RTU P-12".

Professor, Dr.sc.ing. Tālis Juhna obtained a Doctoral degree in engineering at Lulea Technical University, Sweden, in 2002. Since 2002, he has been a Professor of Riga Technical University and the head of study programmes. Member and founder of the Board of Conelum (2017); Member and Deputy Chair of the Council of Rīgas ūdens, Ltd. (2021); Head of the Advisory Board of the Latvian Council of Science (2021). Additional education: Cambridge, United Kingdom, drawing up of the European Union framework projects, financial aspects (2007). Riga Coaching School, Manager Leadership Courses (2020). Scientific research areas: ensuring water quality in the urban environment and generating energy from wastewater and renewable natural resources. He has established a Water Research Laboratory, which conducts research on drinking water purification, distribution systems, water quality and the formation of microorganism biofilm in the grid. He has developed an innovation implementation and deployment system at Riga Technical University, creating a variety of support mechanisms (e.g., RTU Design Factory) for development of new technologies. Head and member of the research programmes of the International and Latvian Council of Science, Ministry of Education and Science, etc. Published works: More than 100 scientific works in Latvian, Russian and English, including scientific monographs and patents, have been published. The author of several textbooks. Member of editorial boards of scientific journals and the author of more than 60 (cited>540 times, Scopus Hirsch Index 14) scientific articles published in journals and conference proceedings. Pedagogical work: supervised several Doctoral Theses, including those within a joint study programme with KTH; scientific consultant and scietific adviser of Doctoral Theses; has delivered study courses and study programmes. T. Juhna is the Head of the Study Programme "Biotechnology and Bioengineering" jointly implemented by Riga Technical University and the University of Latvia. He has developed a number of courses to foster student innovation skills (e.g., Vertically Integrated Projects, Demola). Organisational work: He is the Vice-Rector for Research at RTU and supervises around 500 scientists at all institutes. He has introduced

the funding distribution system of RTU. A member of the boards of several science centres, science councils and business incubators (e.g., the Green Technology Incubator). Currently, he is leading the COVID-19 liquidation project coordinating 9 scientific institutions (Latvian Institute of Organic Synthesis, Institute of Electronics and Computer Science (EDI), Institute of Solid State Physics of the University of Latvia (CFI), RTU, etc). Expert: He has worked as an expert on the evaluation of many projects (e.g., EU Framework Programmes) and as a consultant for the development of water engineering projects. The Chair of the Doctoral Council "RTU P-12".

Professor, Dr.sc.ing. Romāns Neilands obtained a Doctoral degree in engineering in 2010 (Riga Technical University). During his study, Prof. Neilands studied not only waste water treatment, but also focused on hydraulics in treatment tanks, which was one of the key factors to ensure purification. Since 2015, he has been holding the position of Professor at the Institute of Heat, Gas and Water Technology, the Department of Water Engineering and Technology, RTU. The main areas of research are biological and physical-chemical processes for waste water treatment and their provision. Below, there are examples of research themes where Prof. Neilands has participated as a researcher: Hydraulic Modelling during Leaching for Engineering Structures; Creation of a Mass and Energy Database for Waste Water Treatment Plants (Excel, Access); Simulation of the Waste Water Treatment Process (StarPro, BioWin, AquiIfas – Models ASM and Bio_Denitro, Bio-P). While working at Riga Technical University, the Department of Water Engineering and Technology, Professor participated in the research programmes: RTU & LR Environmental Technology Competency Centre for modelling and research of the biological treatment of waste water of JSC Valmieras stikla šķiedra, JSC Grindeks. Over the past 15 years, he has developed his competence in the EU environmental and engineering legislation, established cooperation with consultancy companies from Plancenter, Poyry (Finland), Halcrow (the United Kingdom), Tauw (the Netherlands), Sweco (Sweden), BCEOM (France), as well as has been Deputy Head for Technological Affairs at Rīgas ūdens, Ltd. – in charge of Riga City waste water treatment process and the quality of the treated waste water in the biological treatment station "Daugavgrīva". Prof. Neilands is a co-author of 28 scientific publications, including 6 SCOPUS publications, SCOPUS h-index 1. Expert of Employers' Confederation of Latvia (LDDK): development of the Environmental Engineering Programme.

The study programme employs 4 elected associate professors, Doctors of Science who were elected associate professors by the Professors' Council of Civil Engineering and whose scientific and teaching qualifications meet the criteria for evaluating scientific, teaching and organizational qualifications of a candidate for the position of an associate professor specified in the regulations. The associate professors elected by the Professors' Council of Civil Engineering: Dr.sc.ing. Kristīna Kokina Jurģis Zemītis, Dr.sc.ing. Linda Mežule and Dr.sc.ing. Aleksandrs Zajacs.

Associate Professor, Dr.sc.ing. Kristīna Kokina is the Head of the Department of Water Engineering and Technology. In 2000, she obtained a Master degree in chemistry from the University of Latvia and in 2011 – a Doctoral degree in engineering at Riga Technical University. Since 2015, she has been holding the position of Associate Professor at the Institute of Heat, Gas and Water Technologies, RTU. She is also a Senior Researcher at the Water Research and Environmental Biotechnology Laboratory. Her main areas of research are water and wastewater treatment technologies. Recent projects are related to demonstrating technologies for waste water treatment: INTERREG Baltic Sea Region International Cooperation Programme BEST, # R054; WATERCHAIN, CB50; project for groundwater purification "Mobile Biofiltration Technology" by the Latvian Council of Science, as well as project COV-MITIGATE funded by the State Research Programme for Covid-19 mitigation. Kristīna Kokina is also the Head of the Laboratory of Chemistry Elemental Analysis Group at the Institute of Food Safety, Animal Health and Environment "BIOR"; technical expert in water and sewage quality and technology at the Latvian National Accreditation Bureau (LATAK), and expert of the Latvian Council of Science in Engineering, Technology

–Construction and Transportation Engineering. She is a member of the Doctoral Council “RTU P-12”. 20 SCOPUS publications (Scopus ID 26031824500), SCOPUS h-index 4.

Associate Professor, Dr.sc.ing. Linda Mežule. She is an Associate Professor at RTU and Senior Researcher at the Water Research and Environmental Biotechnology Laboratory; co-author of more than 40 international scientific publications in the environmental biotechnology, water engineering and microbiological quality assessment sectors. Since 2005, she has been actively involved in various international and local scientific projects. Currently, she is a scientific leader (project coordinator) of four projects (two ERDF practical research projects, EANET EU-LAC, the Latvian Council of Science Programme for Fundamental and Applied Studies) related to the development of new technologies for resource redeployment and environmental biotechnologies. She is a scientific adviser of Bachelor, Master and Doctoral Theses of students from natural sciences, environmental sciences and engineering industries. In 2017, she received the award of RTU Young Scientist of the Year. She is a co-founder of biotech company Conelum. SCOPUS h-index 7.

4 assistant professors, Doctors of Science, participate in the implementation of the study programme: Dr.sc.ing. Jeļena Tihana, Dr.sc.ing. Lana Migla, Dr.sc.ing. Andris Krūmiņš and Dr.sc.ing. Kristina Ļebedeva.

Assistant Professor, Dr.sc.ing. Jeļena Tihana obtained a Doctoral degree in engineering from Riga Technical University in 2013. At present, she holds the positions of Senior Researcher and Lecturer at the Institute of Heat, Gas and Water Technology, RTU. Jeļena Tihana is currently implementing a post-doctoral research project “Efficiency of Gas Hybrid Equipment in the Climatic Conditions of Latvia”. She has participated in the ESF projects “Development, Optimisation and Sustainability Research of Smart Solutions for Nearly Zero Energy Buildings in Real Climate Conditions” as a Researcher and in the project “Strengthening the Academic Staff of Riga Technical University in Areas of Strategic Specialisation” as a Coordinator. Jeļena Tihana is a certified natural gas designer and implements gas systems projects. Tihana's field of research is the development of gas systems and the possibility of using gas in combination with renewable resources. 7 SCOPUS publications, SCOPUS h-index 2.

Assistant Professor, Dr.sc.ing. Lana Migla obtained a Doctoral degree in engineering from Riga Technical University in 2013. She received the Annual Prize for the Young Scientist in Power Engineering from the Latvian Academy of Sciences. She has worked for 8 years at the Laboratory of Energy Resources of the Institute of Physical Energetics, where she carried out research in the field of power engineering within various international scientific projects and research contract work of public authorities. The main research areas of Lana Migla are alternative energy sources, particularly solar energy, and heating. She has been elected a Researcher at the Institute of Heat, Gas and Water Technology since 2017. A number of Bachelor and Master Theses have been developed under her guidance. In 2019, she participated in training in Greece within the ERASMUS+ programme. Lana Migla has currently received support for post-doctoral research “Latent Heat Storage for Sustainable Operation of the Cooling System”. Lana Migla is a co-author of 44 scientific publications, including 17 SCOPUS publications, SCOPUS h-index 2.

Assistant Professor, Dr.sc.ing. Kristina Ļebedeva obtained a Doctoral degree in engineering from RTU in 2008. K. Ļebedeva gained great experience in the fields of renewable energy use and energy efficiency by working for 19 years at the Laboratory of Energy Resources of the Institute of Physical Energetics. K. Ļebedeva participated in many Latvian (National research programmes, Latvian Council of Science, etc.), European (ESF, EFAR, FP6 and FP7, IEE) and international (Era-Net-Lac) scientific projects as a scientific adviser, senior researcher, researcher and administrative manager. K. Ļebedeva was responsible for implementing the first significant solar energy use projects in Latvia. Working at the Laboratory of Energy Resources of the Institute of Physical

Energetics, she participated in the development of testing ground for solar energy exploration. Since February 2020, she has been working at the Department of Heat Engineering and Technology of the Institute of Heat, Gas and Water Techology, the Faculty of Civil Engineering carrying out research on the practical integration of renewable energy resources into HVAC systems and energy supply systems. K. Ļebedeva actively participates in the research activities of the Faculty of Civil Engineering, RTU: draws up scientific project applications, publishes scientific papers, participates in student training (supervising and reviewing Bachelor, Master and Doctor Theses). In 2012, she received a grant by UNESCO and Peoples' Friendship University of Russia: energy management at international level, sustainable energy development, energy services and renewables. In 2006, she was awarded the annual prize of Latvenergo and the Latvian Academy of Sciences for achievements in power engineering. She regularly reviews Doctoral Theses for the State Scientific Qualification Commission. She has participated in many international conferences, congresses and symposia. Member of the Doctoral Council "RTU P-12". The author of 76 scientific publications (25 SCOPUS). SCOPUS h-index 3, Google Scholar h-index - 5, 1 Latvian patent.

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

Implementation of the study programme involves RTU FCE scientific and academic staff with Doctoral degree in Engineering: 1 Habilitated Doctor of Science and 11 Doctors of Science, including 8 experts of the Latvian Council of Science (LCS). The choice of the academic staff is based on scientific experience, research interests, academic achievements, etc., taking into account the specifics of the study programme and the study courses.

During the reporting phase, teaching activities have been completed by docents Visvaldis Vrublevskis and Prof. Andris Krēsliņš. Instead of them, associate professor Aleksandrs Zajacs (Sharholiding Rigas Siltums) and docent Lana Migla (Institute of Physical Energetics) are involved in the study process. Similarly, Joung scientists Asoc. prof Jurģis Zemītis and Docent Jeļena Tihana are involved as a teaching staff. Such a replacement has reduced the average age of employees and included a common experience in the work of the Institute in previous workplaces.

The table below summarizes the information about qualification of the academic staff at the PhD programme "Heat, Gas and Water Technology". The information about the study courses delivered at the Doctoral level given in the table include compulsory (part A) and part E (final / state examination) study courses. Elective study courses are not included in this table, but are available in the Annexes with descriptions of the study courses

Prof., Dr.habil.sc.ing. Egīls Dzelzītis Study courses: *Automatic Control of Heat, Gas and Water Technological Systems.*

Prof., Dr.sc.ing. Anatolijs Borodiņecs Study courses: *Advanced Solutions in Energetics*, *Scientific workshops in the special field*, *Optimisation of Indoor Climate* and *Research Work*. LCS expert: Engineering and Technologies - Civil and Transportation Engineering and Environmental and Power Engineering.

Assoc. Prof., Dr.sc.ing. Jurģis Zemītis (young scientist) Study courses: *Optimisation of Indoor Climate.* LCS expert: Engineering and Technologies - Civil and Transportation Engineering

Prof., Dr.sc. ing. Tālis Juhna Study courses: *Water Treatment Technology* and *Research Work.* LCS expert: Engineering and Technologies - Civil and Transportation Engineering.

Prof., Dr.sc.ing. Romāns Neilands Study courses: *Advanced Course of Wastewater Treatment.*

Asoc.prof., Dr.sc.ing. Aleksandrs Zajacs (young scientist) Study courses: *Advanced Solutions in Energetics.* LZP eksperts: *LCS expert: Engineering and Technologies - Civil and Transportation Engineering*

Docents, Dr.sc.ing. Andris Krūmiņš Study courses: *Automatic Control of Heat, Gas and Water Technological Systems.* LCS expert: *Engineering and Technologies - Civil and Transportation Engineering.*

Assoc.prof., Dr.sc.ing. Kristīna Kokina LCS expert: Engineering and Technologies - Civil and Transportation Engineering; Study courses: *Water Treatment Technology* and *Research Work.*

Assoc. prof., Dr.sc.ing. Linda Mežule LCS expert: Engineering and Technologies – Environmental Biotechnologies; Study courses: *Water Treatment Technology* and *Research Work.*

Assist. prof., Dr.sc.ing. Jeļena Tihana (young scientist) Study courses: *Special Studies of Gas Supply.*

Assist. prof., Dr.sc.ing. Lana Migla (young scientist) Study courses: *Special Studies of Heat Technology.*

Assist. prof., Dr.sc.ing. Kristina Ļebedeva Study courses: *Special Studies of Heat Technology.* LCS expert: Engineering and Technologies - Environmental and Power Engineering.

Two main reasons why members of academic staff quit working at the study programme should be mentioned. One of them is retirement, another – termination of employment due to commencement of work in the construction industry, which can offer a significantly higher salary.

The tasks of the Faculty of Civil Engineering with regard to academic staff issues are:

- Renewal of the academic and research staff;
- Involvement of foreign researchers;
- Professional training of the existing research and academic staff.

These tasks are being actively accomplished through involvement of new scientists in research projects, as well as through work on increase of the number of PhD students and awarded PhD degrees. The important role in this activity is given to RTU Doctoral and post-doc grants, which allow inviting new international researchers to RTU.

At the moment, RTU is implementing European Social Fund Project SAM 8.2.2. “Strengthening Riga Technical University Academic Staff in the Strategic Specialization Areas”, where one the tasks is recruitment of new members of academic staff. The goal of the project is to strengthen RTU academic staff in 10 study fields of strategic specialization, including the study field “Architecture and Civil Engineering”. The project activities are carried out in three areas:

- Involvement of PhD students in the work of the academic staff at RTU,
- Involvement of foreign academic staff in the work of the academic staff at RTU,
- Improvement of the existing academic staff qualifications, including academic staff internship at an economic operator.

Within the project, academic staff have an opportunity to develop their competence at the courses in professional English, as well as specialized training courses.

In order to provide and maximise the effect of research activities and development of the academic staff, RTU management signs annual agreements with each RTU Faculty, which stipulate certain quantitative parameters for studies, research and valorisation.

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

Based on SciVal data, the main topics covered in the SCOPUS indexed articles published by the academic staff working at the PhD programme "Heat, Gas and Water Technology" in 2015-2021 (a total of 137 publications) include Engineering (27.5%), Environmental Science (12.2 %), and Energy (11.4%). In 2015-2021, publications by the academic staff of the PhD programme "Heat, Gas and Water Technology" made contribution to the development of 75 thematic areas (77 thematic clusters). Publication number dynamics is given in the figure below.

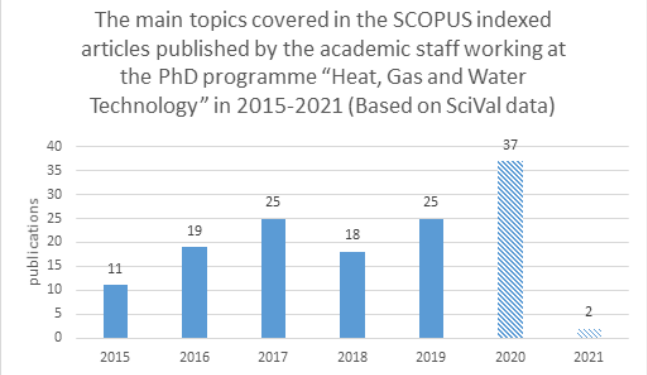


Fig. Number of research publications by the academic staff working at the PhD programme "Heat, Gas and Water Technology" (the data for 2020 and 2021 are incomplete).

In 2015-2021, 137 publications have been cited 461 times, average 3.4 citations per publication. 8.0% publications belong to 10% of most cited publications globally, while 9.4% scientific articles were published in CiteScore top 10% journals. Average one article citation change dynamics is given in the figure below.

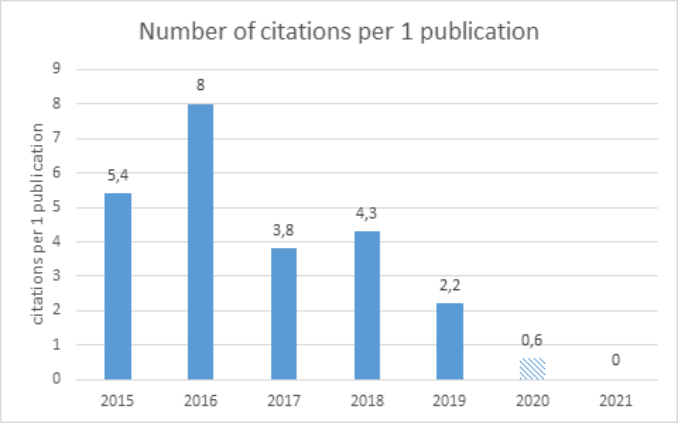


Figure: Citation dynamics of the research publications by the academic staff working at the PhD

programme "Heat, Gas and Water Technology" (the data for 2020 and 2021 are incomplete).

Most significant partners in the development of scientific publications: Peter the Great St. Petersburg Polytechnical University; University of Latvia, Tallinn University of Technology; Institute of Physical energetics, Swiss Federal Institute of Aquatic Science and Technology; KTH Royal Institute of Technology; University of Mostaganem, University of Tarty, Institute of Food Safety Animal Health and Environment.

Research work is an integral part of the activity of the academic staff at the PhD programme "Heat, Gas and Water Technology". Researchers regularly publish the results of their research in scientific journals and report about them to the researchers from other countries at the international conferences. The most significant publications written by the academic staff and PhD students over the past years, indexed in SCOPUS and Web of Science databases are listed below:

- Baranova, D., Sovetnikov, D., & Borodinecs, A. (2018). The extensive analysis of building energy performance across the Baltic Sea Region. Science and Technology for the Built Environment, 24(9), 982-993. doi:10.1080/23744731.2018.1465753
- Borodinecs, A., Prozuments, A., Zajacs, A., & Zemitis, J. (2019). Retrofitting of fire stations in cold climate regions. Magazine of Civil Engineering, 90(6), 85-92. doi:10.18720/MCE.90.8
- Prozuments, A., Borodinecs, A., & Zemitis, J. (2020). Survey based evaluation of indoor environment in an administrative military facility. Journal of Sustainable Architecture and Civil Engineering, 27(2), 96-107. doi:10.5755/j01.sace.26.2.26079
- Staveckis, A., & Borodinecs, A. (2021). Impact of impinging jet ventilation on thermal comfort and indoor air quality in office buildings. Energy and Buildings, 235 doi:10.1016/j.enbuild.2021.110738
- Zajacs, A., Bogdanovics, R., & Borodinecs, A. (2020). Analysis of low temperature lift heat pump application in a district heating system for flue gas condenser efficiency improvement. Sustainable Cities and Society, 57 doi:10.1016/j.scs.2020.102130
- Zajacs, A., & Borodiņecs, A. (2019). Assessment of development scenarios of district heating systems. Sustainable Cities and Society, 48 doi:10.1016/j.scs.2019.101540
- Zajacs, A., Borodiņecs, A., & Bogdanovičs, R. (2020). Assessment of the efficiency and reliability of the district heating systems within different development scenarios doi:10.1007/978-981-32-9868-2_32 Retrieved from
- Zemitis, J., & Borodinecs, A. (2020). Analysis of wind speed influence on heat recovery efficiency of local decentralized alternating ventilation units. Paper presented at the ASHRAE Transactions, 126 360-368.
- Dalecka, B., Strods, M., Juhna, T., & Rajarao, G. K. (2020). Removal of total phosphorus, ammonia nitrogen and organic carbon from non-sterile municipal wastewater with trametes versicolor and aspergillus luchuensis. Microbiological Research, 241 doi:10.1016/j.micres.2020.126586
- Frolova, M., Tihomirova, K., Mežule, L., Rubulis, J., Gruškeviča, K., & Juhna, T. (2017). Evaluation of pre-treatment technologies for phosphorous removal from drinking water to mitigate membrane biofouling. Paper presented at the IOP Conference Series: Materials Science and Engineering, 251(1) doi:10.1088/1757-899X/251/1/012127 Retrieved from www.scopus.com
- Lavrinovičs, A., Mežule, L., & Juhna, T. (2020). Microalgae starvation for enhanced phosphorus uptake from municipal wastewater. Algal Research, 52 doi:10.1016/j.algal.2020.102090
- Menad, K., Feddag, A., & Juhna, T. (2019). Copper (II)–Humic acid adsorption process using microporous-zeolite na-X. Journal of Inorganic and Organometallic Polymers and Materials, 29(1) doi:10.1007/s10904-018-0958-9

- Tihomirova, K., Denisova, V., Golovko, K., Kirilina–Gutmane, O., Mezule, L., & Juhna, T. (2019). Management of wastewater from landfill of inorganic fiberglass. Agronomy Research, 17, 1216-1226. doi:10.15159/AR.19.016
- Zemitis, J., & Bogdanovics, R. (2020). Heat recovery efficiency of local decentralized ventilation devices. Magazine of Civil Engineering, 94(2), 120-128. doi:10.18720/MCE.94.10
- Zemitis, J., & Bogdanovics, R. (2020). Preliminary results of indoor moisture excess measurements for residential and office buildings in Latvia. Paper presented at the E3S Web of Conferences, 172doi:10.1051/e3sconf/202017211008
- Lebedeva, K., & Migla, L. (2020). Latent thermal energy storage for solar driven cooling systems. Paper presented at the Engineering for Rural Development, 19 1134-1139. doi:10.22616/ERDev.2020.19.TF273
- Migla, L., Snegirjovs, A., & Shutenkova, O. (2020). Performance analysis of solar assisted ground coupled heat pump system in Latvia. Paper presented at the E3S Web of Conferences, 172 doi:10.1051/e3sconf/202017222011

A large part of the teaching staff are experts from the Latvian Council of Science experts, who engage not only in academic work but also in scientific, research work, such as the leaders of the work of Promotia, scientific leaders of research projects, which enable students to carry out practical studies.

Teaching staff – Latvian Council of Science experts

Name	Surname	Branch of science	Term
Anatolijs	Borodiņecs	Civil Engineering	29.07.2022
		Environmental Engineering and Energy	25.05.2023
Tālis	Juhna	Civil Engineering	16.10.2022
Kristīna	Kokina	Civil Engineering	21.08.2022
Aleksandrs	Zajacs	Civil Engineering	20.02.2022
Jurģis	Zemītis	Civil Engineering	18.11.2022
Andris	Krūmiņš	Civil Engineering	21.08.2022
Kristina	Ļebedeva	Environmental Engineering and Energy	18.12.2022
Linda	Mežule	Environmental Biotechnology	23.04.2023

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

During the reporting period, the academic staff of the faculty, involving PhD students of the PhD study programme "**Heat, Gas and Water Technology**", has actively implemented international and Latvian scale scientific projects. The most important international projects include:

EU HORIZON2020 (H2020-EE-2014-1-PPP) Development and advanced prefabrication of innovative, multifunctional building envelope elements for MOdular REtrofitting and CONNECTions – work package manager;

EU Seventh Framework Programme (FP7) - Strategies Towards Energy Performance and Urban Planning (STEP-UP) – work package manager;

EU INTERREG IV A Central Baltic Cooperation in energy efficiency & feasibility in urban planning (ENEF) – work package manager;

2020. - 2022. ERDF "Post-doctoral Research Aid". "Latent heat for sustainable cooling system. No.1.1.1.2/VIAA/4/20/661- principal performer;

2019 – 2021. ERDF "Post-doctoral Research Aid". Energy efficient and reliable heat supply solutions" *No. 1.1.1.2/VIAA/2/18/344,* principal performer;

2018. -2020. ERDF "Post-doctoral Research Aid". "IAQ and well-being of humans in modern built environment 1.1.1.2/VIAA/1/16/033, principal performer;

2018 -2020 Hi-Water Efficient and affordable water treatment technologies to minimize waterborne diseases. ERA-NET EU-LAC Joint Program.

2017 – 2020 B-LIQ („Development of an Integrated Process for Conversion of Biomass to Affordable Liquid Biofuel" IPP3: INNO INDIGO Programme

2016 – 2018 WATERCHAIN - Pilot watersheds as a practical tool to reduce the harmful inflows into the Baltic Sea. Central Baltic Programme Interreg (RTU team coordinator)

2016 – 2018 POMACEA - Affordable technology for mitigation of membrane (bio) fouling through optimisation of pre- treatment And Cleaning methods. INNO INDIGO Programme - Clean Water and Health (RTU team coordinator)

2009 – 2013 SECUREAU - Security and decontamination of drinking water distribution systems following a deliberate contamination. EU 7th Framework Programme (senior researcher)

2006 – 2010 TECHNEAU – Technology enabled universal access to safe water. EU 6th Framework Programme (researcher)

2003. – 2006. EU 5th Framework Programme, project "SAFER" (Grant No EVK1-2001-00185)

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

Within the study programme, there is a cooperation stimulation mechanism for academic staff that

provides enhancement and integration of the study courses. Both PhD student survey results and alumni survey results allow getting feedback, which identifies certain shortcomings. Thus, the study courses are improved on a regular basis, considering both student suggestions and industry development trends.

Upon completion of every academic year, PhD student competence is attested by the Scientific Committee of the Faculty of Civil Engineering. At the attestation meetings, Doctoral students inform the Committee and their groupmates about the progress in their research and their learning issues. Moreover, such discussions are a form of feedback, which allows defining the character of necessary additions and amendments. During reconciliation of the study courses, all relevant academic staff are involved, ensuring that the themes considered within the study programme are continuously updated and optimized in cooperation with the associated industry professionals.

Cooperation of the academic staff within the study programme is considered to promote achievement of the learning outcomes. Reviewing and updating the study programme, the academic staff mutually agree on the most appropriate and effective solutions for evaluation of the learning outcomes and achievement of performance indicators. Periodical discussions and review of the study course syllabus help achieve thematically harmonized and complementary training, avoiding duplication of questions discussed within different courses of one study programme.

The rate of the RTU elected and permanently employed academic staff to students at the PhD programme “Heat, Gas and Water Technology” is approximately 1 to 3.

Annexes

III - Description of the Study Programme - 3.1. Indicators Describing the Study Programme		
Sample of the diploma and its supplement to be issued for completing the study programme	Doktora_diploma_paraugs.docx	Doktora_diploma_paraugs.docx
For academic study programmes - Opinion of the Council of Higher Education in accordance with Section 55, Paragraph two of the Law on Higher Education Institutions (if applicable)	AIP ENG.rar	Nr_87_RTU_Dokt_siltum_par+250+stud.edoc
Compliance of the joint study programme with the provisions of the Law on Higher Education Institutions (table) (if applicable)		
Statistics on the students in the reporting period	RBDSO_5. annex ENG.docx	RBDSO 5.pielikums.docx
III - Description of the Study Programme - 3.2. The Content of Studies and Implementation Thereof		
Compliance with the study programme with the State Education Standard		
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard or the requirements for professional qualification (if applicable)		
Compliance of the study programme with the specific regulatory framework applicable to the relevant field (if applicable)		
Mapping of the study courses/ modules for the achievement of the learning outcomes of the study programme	RBDSO 8. annexENG.xlsx	RBDSO 8. pielikums.xlsx
The curriculum of the study programme (for each type and form of the implementation of the study programme)	9. annex RBDSO ENG.pdf	9. pielikums RBDSO.pdf
Descriptions of the study courses/ modules	RBDSO ENG.rar	RBDSO LV.rar
Description of the organisation of the internship of the students (if applicable)		
III - Description of the Study Programme - 3.4. Teaching Staff		
Confirmation that the academic staff of the doctoral study programme includes not less than five doctors, of which at least three are experts approved by the Latvian Council of Science in the branch or sub-branch of science in which the study programme intends to award a scientific degree (if applicable)	Confirmation - on compliance of the academic staff of the doctoral study programmes.zip	Apliecinājums - LZP eksperti doktora programmā.zip
Confirmation that the academic staff of the academic study programme complies with the requirements specified in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions (if applicable)	Confirmation - on compliance of the academic staff.edoc	Apliecinājums - AL 55. pants par prof. skaitu akadēmiskās programmās.edoc

Civil Engineering (47582)

Study field	*Architecture and Construction*
ProcedureStudyProgram.Name	*Civil Engineering*
Education classification code	*47582*
Type of the study programme	*Professional master study programme*
Name of the study programme director	*Baiba*
Surname of the study programme director	*Gaujēna*
E-mail of the study programme director	*baiba.gaujena@rtu.lv*
Title of the study programme director	*Asoc. profesore/ Dr.sc.ing.*
Phone of the study programme director	
Goal of the study programme	*The aim of the Master study programme is to ensure academic education in the field of engineering and subfield of civil engineering and construction in order to train and educate students and prepare them for further studies at the Doctoral study programme. The programme is intended to train students to perform pedagogical work at the HEI as well as practical work at the enterprises. The students with the 2nd Level higher professional education in civil engineering and/or with a Bachelor Degree in civil engineering can be enrolled to the study programme.*
Tasks of the study programme	*The study programme curriculum comprises compulsory courses; compulsory elective courses; courses of pedagogy and psychology.* *During the studies a student acquires:* *-skils to apply theoretical knowledge required to formulate and solve definite tasks in the field of civil engineering;* *-skills to obtain and apply experimental data and relevant software programs;* *-skills to organize and perform pedagogical work.*
Results of the study programme	*Graduates of Study programme:* *- are able to demonstrate a comprehensive knowledge of facts, theories and patterns necessary for personal growth and development, civic participation, social integration and continuing education;* *- are able to understand in detail and demonstrate knowledge of a wide variety of specific facts, principles, processes and concepts in a given field of study or professional activity;* *- are familiar with technologies and methods for carrying out learning tasks or work assignments;* *- are able to plan and organise work, use a variety of methods, technologies, devices, tools and materials to carry out tasks;* *- are able to cooperate, plan and carry out learning or work tasks in the profession individually, in a team or by leading a team.* *Master's professional studies provide knowledge that creates a high degree of culture and intelligence, enabling to engage in social and professional activities, to have contact with academic and professional circles in Latvia and abroad.*
Final examination upon the completion of the study programme	*Master Paper is a scientific research in the field of civil engineering.*

Study programme forms

Full time studies - 1 years - latvian

Study type and form	*Full time studies*
Duration in full years	*1*
Duration in month	*0*
Language	*latvian*
Amount (CP)	*40*
Admission requirements (in English)	*professional bachelor degree in civil engineering and professional qualification of a civil engineer, or comparable education*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Professional Master Degree in Civil 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 - 1 years - english

Study type and form	*Full time studies*
Duration in full years	*1*
Duration in month	*0*
Language	*english*
Amount (CP)	*40*
Admission requirements (in English)	*professional bachelor degree in civil engineering and professional qualification of a civil engineer, or comparable education, English language level B2*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Professional Master Degree in Civil 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, 6 months - latvian

Study type and form	*Full time studies*
Duration in full years	*2*
Duration in month	*6*
Language	*latvian*
Amount (CP)	*100*
Admission requirements (in English)	*a bachelor degree in engineering or comparable education*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Professional Master Degree in Civil Engineering*
Qualification to be obtained (in english)	*Civil Engineer*

Places of implementation

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

Full time studies - 2 years, 6 months - english

Study type and form	*Full time studies*
Duration in full years	*2*
Duration in month	*6*
Language	*english*
Amount (CP)	*100*
Admission requirements (in English)	*a bachelor degree in engineering or comparable education, English language level B2*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Professional Master Degree in Civil Engineering*
Qualification to be obtained (in english)	*Civil Engineer*

Places of implementation

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

3.1. Indicators Describing the Study Programme

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

Professional Master Study Programme "Civil Engineering", classification code 47582. Accredited by the decision of the Accreditation Commission of LR Ministry of Education and Science of 29 May, 2017 – accreditation certificate No. 2020/39.

Based on recommendations made for improvement of the study programme in the previous period and changes in the sector and the recommendations of industry professionals, the following courses have been adjusted.

- Part Internship of the study programme was amended, formulating learning outcomes, which were integrated into the learning process. For instance, if a student undergoes internship at a company, which conducts civil works, then the Internship is attached to the study courses in technologies and occupational safety, but if the internship is done at a company that carries out structural design, then it is attached to the courses in timber, metal and reinforced concrete structural design. The description of the study courses defines the aims, tasks and learning outcomes. In addition, the supervision offered by the academic staff throughout the study course is provided in the form of consultations.
- New study courses BRC409 "Engineering Geology of Latvia", where the student will acquire knowledge about the geological structure of Latvia, geological processes and soils and their investigation, BRC582 "Special Course of Geotechnical Engineering", where the student will learn the methods of calculating underground structures, BBR748 "Modern Methods and Equipment for Industrial Waste Treatment and Recycling", in which the student will learn the terminology, methods of techno-economic analysis, main trends, methods and equipment for the reuse and recycling of industrial waste and construction technological waste, as well as the study course BBR749 "Modern Building Machines and Equipment", in which the student will learn modern terminology and the main tendencies of mechanisation in construction industry.
- Furthermore, according to the provisions in force, other study courses have been improved and new ones were elaborated, so as to improve the quality of the study programme and its compliance to the highest European standards of education.
- Current industry trend-related changes have been made to the study courses BKA700 Modern materials for developing construction.

During the reporting period, the course BBK712 Structural Fire Design was excluded from the list of the study courses, fire safety issues are reviewed within other study courses, for example, BMT322 Building Protection. Some elective courses, such as BMT456 Protection of Environment in Civil Engineering and BMT463 Technological Design were also excluded.

Also, due to changes in the qualification structure of the branches and the legislation of the Republic of Latvia, the professional qualification obtained in the professional master's study program "Civil Engineering" was adjusted from "engineer of civil engineering" to "civil engineer".

As well as the admission requirements for the first implementation from “professional bachelor’s degree in civil engineering” to “professional bachelor’s degree in civil engineering and professional qualification of civil engineer or equivalent” and admission requirements for the second implementation option from “bachelor of civil engineering” to “bachelor of civil engineering or comparable education”.

Outlines and descriptions of the study courses are given in Annexes 9 and 10.

The study programme is implemented on a full-time basis in two options: 1 year and 2.5 years. The study programme is implemented in Latvian and English, in Riga.

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

The **Professional Master Study Programme "Civil Engineering"** has been developed in accordance with the Law on Higher Education Institutions of the Republic of Latvia and the Classification of Education of the Republic of Latvia.

The principles of the Latvian Qualifications Framework (LQF) and the European Qualifications Framework (EQF) are maximally observed during the implementation and development of the study programme.

The study programme has been developed taking into account strategic objectives of RTU, market supply and potential demand.

The title of the study programme, the awarded degree, professional qualifications, aims and tasks are interrelated. The curriculum has been systematically designed to let alumni develop their careers at the enterprises that operate in construction sector both as civil works managers, and as civil engineers, as well as in other industry related jobs. The programme admits applicants with a Bachelor Degree in Civil Engineering. Matriculation procedure for Master studies is regulated by the approved RTU Senate “Enrolment rules for academic and professional undergraduate study programmes”.

Graduates of the study programme:

- are able to demonstrate comprehensive knowledge of facts, theories and patterns, necessary for personal growth and development, civil participation, social integration and further education;
- are able to understand in detail and show the knowledge of various specific facts, principles, processes and notions for certain regular and irregular situations in academic or engineering fields;
- know technologies and techniques needed for fulfilment of learning or work tasks;
- are able to plan and organize work processes using different methods, technologies, tools and materials for fulfilment of tasks;
- are able to cooperate, plan and fulfil learning or professional tasks working individually, in a

team or managing team work;

The professional Master study programme provides knowledge that builds a high degree of culture and intelligence, allowing the student to engage in social and professional activities, and to have contact with academic and professional circles in Latvia and abroad.

The study programme is professional; thus, it always offers learning field trips and exchange of practical information at the enterprises and practical classes to improve skills and competences of students according to the set learning outcomes of the study programme.

The study programme promotes implementation of the leitmotif of Riga Technical University (RTU) as defined in its 2021-2025 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 educated and trains European and global-level engineers – leaders: developers of new technologies.” (Strategy | Riga Technical University (rtu.lv)).

The study programme fully complies with the development aim of RTU Faculty of Civil Engineering – to become an internationally recognized leading Latvian educational, research and development institution in the field of civil engineering, providing high quality study process, internationally recognized research and sustainable innovation, commercialization and knowledge transfer for economic development.

The types of implementation of the study program are 1 year, which corresponds to 40 CP and 2 years and 6 months, which corresponds to 100 CP, the form of implementation of both types of studies is full-time studies. Both types of implementation include compulsory study courses, limited choice study courses, pedagogy and psychology study courses, as well as practical placement and state examination. For the first variant, the final examination includes a master's thesis, but for the second variant it is a master's thesis with engineering design project. It is possible to acquire the study program in two variants, but the conditions of admission and the level of previously acquired education differ.

After 2 years and 6 months in the professional bachelor's study programme, the student obtains the qualification of civil engineer, which corresponds to the professional standard PS-184 (PS-184.pdf (visc.gov.lv) (In Latvian)), approved in 2021.

Programme code 47582 complies with Cabinet of Ministers Regulation No 322 Latvian Classification of Education. The first and second levels of classification, represented by the first two digits of code 47, Second-level professional higher education (professional master's degree or level 5 professional qualification), awarded after obtaining a bachelor's degree, professional bachelor's degree or level 5 professional qualification. The third, fourth and fifth levels of classification (thematic groups, subject areas and programme groups), denoted by the next three digits 582, are Civil Engineering (58 stands for Architecture and Civil Engineering).

Despite the two implementation options, both options are in line with the programme's objectives, targets and deliverables. In the first implementation option, the student studies for a shorter period of time, but some of the courses have already been covered at the previous level of education, so the student's prior knowledge helps to achieve the learning outcomes in a shorter period of time, while in the second implementation option the student studies additional courses which, in general, meet all the aims, objectives and outcomes of the programme.

International students must have a B2 Upper-Intermediate level of English at entry to the Master's programme.

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

Highly qualified professionals, namely, civil engineers, of the professions subject to the national regulation are trained in the majority of **The Professional Master Study Programme "Civil Engineering"**.

Professionals educated within the scope of the study program involve in processes aimed at improving, maintaining and transforming the quality of the living space of the society, and implementation of the study program comprised therein is based on complex knowledge and understanding of the interaction of technical, social and economic factors in creating sustainable environment. These principles conform to the long-term interests of the Republic of Latvia and RTU strategy guidelines.

The study program comprised by it conform with the strategic development directions of the university, the needs of the public and the national economy and development trends. All the programs include the requirements of the Latvian and the European Union legislation.

The economic and social substantiation of the study program is based on performed industry surveys, which are regularly performed on annual basis by the Ministry of Economics, and it is aimed at following up the development trends of the civil engineering field, including fluctuations in the increase of the construction and the indices of increase of the construction costs, in order to identify factors hindering development of the industry and eventual overheating risks in a timely manner, as well as forecasting the production scope and costs in the next years by applying forecasting methods. The survey reveals that during the whole period from 2020 to 2024 the experts and combined forecasts predict further increase of the industry costs. During the period from 2020 to 2022 this increase could be estimated within a range of 1% to 5% per year, and in 2024 it could achieve 6%. According to the forecast the biggest increase of costs relates to labour costs where the combined forecast predicts a general increase of 8% to 10% per year over the period from 2020 to 2024. As regards sub-fields, in 2020 a decrease of the industry costs is predicted in the construction of residential and non-residential buildings, as well as in the construction of roads and highways. The most rapid increase is predicted in the construction of bridges and tunnels. An increase of costs in all the sub-fields is forecasted as from 2022 by the construction of bridges and tunnels leading with an annual increase of 5-7%.

The industry researchers have concluded that also defects and deficiencies in construction design documents and insufficient scope of preliminary studies present risks of increase of prices on the level of individual sites in the industry of architecture and civil engineering. In order to mitigate this risk, it is important to implement the building information modelling (BIM) system in Latvia as soon as possible, as it can considerably improve the quality of construction design documents, contribute to predictability of construction, optimise organisation of construction works and their sequential performance, reduce construction terms and improve efficiency of project management and supervision.

The civil engineering industry has experienced very fast development as from 2017. Its growth amounted to 19.4% in 2017 and to 21.9% in 2018; construction volumes increased in all the core groups of construction during the last year. Both availability of the EU funding and private investment encourage the industry growth. Attraction of employees in the industry has restarted since 2018, the number of employees was 74.6 thousand last year accounting for 30% increase

compared to 2010, however, the pace of the growth was lagging behind that of the production growth. The wages of employees have increased considerably in the industry during the last two years and last year they amounted to 94.6% of the mean wage in the national economy.

When analysing the employment of graduates, it should be noted that they are mainly employed in private companies, municipal development departments and construction boards, design companies, public administrations and other sector-related organisations. These include "Skonto Būve" Ltd, "Merks" Ltd, "UPB" JSC, international companies such as Hilti, Peri, Knauf, Riga Construction Board and other construction boards. Many students find a job during their internship, and around 90% continue to work in their internship after graduation.

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

During the reporting period, **the Professional Master Study Programme "Civil Engineering"** was implemented in Latvian and English on a full-time basis.

Number of students:

As of May 2021, the total number of students enrolled in the programme "Civil Engineering" was 92, which was less than half the number of students enrolled in 2017. Taking into account the enrolment statistics of recent years, it can be concluded that the number of students is decreasing, which reflects the fact that there is a critical shortage of skilled workforce in the sector and after studying at a professional Bachelor programme, specialists choose to work in the sector rather than continue their studies at a higher education institution.

For detailed information about distribution of students see Graph 1 and 2 in Annex 5.

Breakdown by the source of funding:

In the academic *year* 2020/2021, *the correlation between state funded seats and studies for tuition fees was* 100 to 0. Such a ratio between the budget funded seats and studies for tuition fees is observed with very few annual fluctuations, as, for example, in academic year 2016/2017 it was 99 to 1. For comparison by the source of funding, by the number of students and percentage for the reporting period see Graph 3 through 9 in Annex 5. As can be seen, the number of Master students does not exceed the number of budget funded study places; thus, the students' own financial resources are not used in this programme.

Number of alumni:

In the academic year 2019/2020, 20 alumni were awarded a professional Master degree in civil engineering (see Graph 10 of Annex 5). Compared to academic year 2016/2017, the number of alumni did not decrease, even slightly increased, which can be estimated as a positive indicator.

Drop-out rates:

In 2019/2020 academic year, 57 students dropped out for various reasons, which was significantly lower than in 2017/2018 academic year, while in 2016/2017 academic year there were no drop-outs at all, suggesting that these figures are not predictable. For precise comparison of full-time and part-time students drop-out rates by years and courses see Chart 5 in Annex 5.

The main reasons for drop-out:

- failure to pass the study courses, for example, in academic year 2017/18, all 126 out of 126 students were extramatriculated exactly due to academic underachievement, while in 2018/19 - 10 out of 12 expelled were exmatriculated for this reason;
- students understand that the chosen industry does not meet their expectations, for example, in academic year 2018/19, 2 students left studies for this reason, but in 2019/20 - also only 2 students;
- students leave studies due to social and family circumstances;
- due to financial reasons, since student work in parallel to studies;
- due to epidemiological situation, which affected the studies directly during the last terms, students admitted that they fail to study online and fail to pass the study courses.

But students also renew studies after expulsion due to all above mentioned reasons, which is estimated as a good indicator. For example, in academic year 2016/17 there were 10 students, in 2018/19 - 32 students, but in 2020/21 there were 22 students. For comparison by courses and academic years see Graph 6 in Annex 5.

Full-time students of the study programme are offered an opportunity to take part in the international student exchange (mobility) project *Erasmus+*. However, due to great demand for engineering specialists in the labour market, in the reporting period none of the students opted to spend a semester abroad.

Number of foreign students:

In 2020/2021 academic year, 1 international student started studies at the programme, which could be explained by the epidemiological situation around the world; in total 21 international students chose to study at the programme during the whole reporting period.

The student analysis was carried out for the 1-year implementation option, as no students were enrolled in the second implementation option during the reporting period.

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

3.2. The Content of Studies and Implementation Thereof

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

The goals of **the Professional Master Study Programme "Civil Engineering"** are:

1) to provide academic education in the sub-discipline of civil engineering, to prepare students for further doctoral studies, pedagogical work at higher education institutions or practical work

2) to provide higher second level professional education in the construction sector for applicants with an Academic Bachelor Degree in Civil Engineering and to prepare engineers for permanent employment.

The syllabus of the study courses is based on the aims and learning outcomes of the study course, which for their part derive from the aim and learning outcomes of the programme. Such interrelation is clearly seen from the mapping of the study programme (Annex 8).

All study courses in the programme are divided into 5 blocks:

Variant 1

Part A (8 CP) – Compulsory study courses;

Part B (6 CP) – Compulsory elective study courses divided into sub-sections – professional specialization study courses, as well as study courses in pedagogy and psychology;

Part D (6 CP) – Internship.

Part E (20 CP) – Final / state examinations, which include a Master Thesis.

Variant 2

Section A (23 CP) – Compulsory study courses.

Section B (19 CP) – Compulsory elective study courses divided into sub-sections – professional specialization study courses, as well as study courses in pedagogy and psychology;

Section D (32 CP) – Internship.

Section E (26 CP) – Final / state examinations, which include a Master Thesis.

Each study course has a defined aim and learning outcomes to be achieved. All knowledge, skills and competences in the study course are related and subordinated to the aims and expected learning outcomes of the study programme. The plan of the study programme is given in Annex 9, the descriptions of the study courses – in Annex 10. Each study course provides acquisition of 1 through 5 programme outcomes. Each programme outcome corresponds to at least 1 study course, but on average these are 5 or more courses.

Prior to the start of an academic term, each member of the academic staff has to examine the course description, assessing the existing aims of the course and the expected learning outcomes, and has to examine the learning materials and literature, make sure that the literature is up-to-date and includes the advanced research in the field. Analysis of compliance of the curriculum of the study programme "Civil Engineering" to the state standards allows concluding that the programme complies fully to the requirements. For compliance of the study programme to the state education standard see Annex 6 and for compliance of the study programme to the professional standard see Annex 7. To provide the cross- complementarity of the study courses, as well as to avoid duplication, the academic staff discusses regularly the structure of the study programme. The descriptions of the study courses are available on *ORTUS* platform, so the academic staff has access to descriptions of other study courses which ensures their interconnection.

The Professional Master Study Programme "Civil Engineering" is in line with construction trends in the EU and worldwide. During its development, the changes in the construction industry in Latvia and across Europe were studied. The main emphasis was placed on the introduction of new technologies in the teaching process, as well as training students in the use of building information modelling already in the course of study.

The study programme is being improved to make it appealing for young professionals. Research and analysis are carried out considering other universities across different European regions in order to improve the study programme as comprehensively as possible. The study courses within the study programme are based on general trends in construction industry – they are included in the study courses, also the general professional understanding of the study courses needed to be mastered by the professionals in the field is also covered. The study programme is modern and follows the latest trends outside Latvia, as well as it is specific enough in Latvia to claim that it has its own well-defined place in the family of other study programmes in the field of engineering sciences.

The academic staff of the programme regularly follow and update the study courses so that they are based on the achievements and acknowledgements of the respective field of science. Course descriptions will be approved by the Programme Director and the Head of Department prior to the start of each semester to keep abreast of academic staff workload and possible development. The teaching staff also update the content of study courses in accordance with the trends of scientific development, using information available in the databases of scientific articles - EBSCO, Emerald, Scopus, Web of Science, etc. Academic personnel are motivated to publish the results of their research, especially in the scientific databases SCOPUS and Web of Science, with a royalty for each article published in these databases. The results of the academic staff development are evaluated each year during the annual appraisal and the results are used to plan further professional advancement of each member of the academic staff.

Based on the information from the Central Statistical Database, it may be concluded that the demand for highly qualified specialists in civil engineering is variable, yet growing spirally, which is impacted directly by the global economic situation, nevertheless in the future it is expected only to increase, thus allowing to conclude that the study programme is important and significant in promoting economic activities in Latvia and Europe (see Table 2.1.).

Table 2.1.

Employees by type of economic activity					
Industry	Number (thsd)				
	2016	2017	2018	2019	2020
Agriculture, forestry and fisheries	68,7	61,4	63,3	66,3	64,3
Mining and quarrying	3,4	2,3	3,0	3,2	2,7
Manufacturing	123,5	120,9	116,9	115,1	114,5
Electricity, gas, steam and air conditioning supply	14,0	13,1	12,3	9,4	10,7

Water supply, sewerage, waste management and remediation activities	8,3	9,1	7,9	6,7	6,2
Civil Engineering	**66,1**	**63,1**	**74,6**	**81,1**	**76,5**
Information and communication services	23,8	28,3	29,0	25,6	31,1
Operācijas ar nekustamo īpašumu	21,4	19,8	20,4	21,7	19,7
Professional, scientific and technical services	33,6	39,6	36,3	33,4	37,0
Education	81,7	82,3	83,3	83,3	81,6
Other services	19,9	20,9	18,2	16,4	21,2

The study programme is improved after evaluation of the final examinations, as representatives of employers regularly take part in the work of Graduate Paper Examination Committees to assess the knowledge acquired by students within the study programme. Participating in the work of the Graduate Paper Examination Committees representatives from the industry can express their suggestions concerning the desired topics for student research in demand in the labour market. These recommendations are taken into account while improving the courses of the study programme for the next academic year.

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

The Professional Master Study Programme "Civil Engineering" degree is assigned in the field of science of Civil Engineering.

The themes of theoretical works and practical tasks of the study programme are regularly related to advances in the industry. Research and creative work results are published in scientific journals and conference proceedings, which is included in SCOPUS and WEB of Science databases. Annually, academic staff and students of FCE publish several dozens of articles in various national and international scientific periodicals and take part at local and international scientific conferences.

3.2.3. Assessment of the study programme including the study course/ module implementation methods by indicating what the methods are, and how they contribute to the achievement of the learning outcomes of the study courses and the aims of the study programme. In the case of a joint study programme, or in case the study programme is

implemented in a foreign language or in the form of distance learning, describe in detail the methods used to deliver such a study programme. Provide an explanation of how the student-centred principles are taken into account in the implementation of the study process.

Each study course of the **Professional Master Study Programme "Civil Engineering"** defines the knowledge, skills and competences to be acquired, which contribute to the achievement of the learning outcomes of the study programme. The forms of assessment shall be determined by the academic staff in accordance with the learning outcomes of the study course. Each instructor within their study course tests the knowledge, skills and competences of the students specified in the course description (papers, tests, presentations, independent works, case study analyses, group works, etc.). The final grade is the sum of all test papers and examination grades, the percentages of which are also indicated in each course description and presented to students at the beginning of the semester.

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 in ORTUS portal beforehand. During semester, the assessment for each home task, test, report, presentation and any other task is ascrbed 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 program and learning outcomes are taken into consideration.

Most commonly, to assess knowledge and to demonstrate what a student has learned within the study course, tests or assignments are used. Skills are assessed mostly through practical, analytical, creative individual and group assignments that require the student to apply the acquired knowledge in practice. Students demonstrate the acquired competences by presenting, discussing and justifying what they have learned in the course, both orally and in writing. The acquisition of knowledge, skills and competences within the study programme includes theory, practical examples, lectures, group assignments, interactive discussions, and lectures by guest lecturers from the industry.

The Professional Master Study Programme "Civil Engineering" is implemented on a full-time basis with the number of examinations being determined by the amount of credit points within each course.

All study courses included in the study programme are implemented in accordance with the course descriptions. The study courses are evaluated in accordance with the RTU Senate Decision of 29 March 2010 "On the Regulations for Evaluation of Learning Outcomes", the RTU Senate Decision of 25 May 2001 "On the Criteria for Evaluation of Learning Outcomes " and the RTU Senate Decision of 29 January 2001 "On the Transition to a Unified Evaluation of Study Results" in a 10-point system (10 - excellent, 1 - very, very poor). The examinations consist of tests, study papers and exams according to the study plans approved for each semester.

A student can only present their graduate/Master Thesis once they have mastered the entire study programme curriculum. Study courses assessed with a negative mark must be retaken.

The principles of student-centred education are also taken into account in the implementation of the study process, which is implemented in the following way:

- Student involvement in the study process and its development:

Riga Technical University regularly analyses the questionnaires that each student completes at the end of the semester for each course. The students also organise meetings with the programme director to discuss the positive and negative features of the semester courses, as well as the competence, abilities, attitude and quality of each member of academic staff. In this way, students have the opportunity to influence the study process and contribute to its improvement.

- Respecting students' abilities:

Academic staff take into account and respect student diversity and their needs, using different ways of delivering the programme according to students' capabilities.

- Handling student complaints:

The University has appropriate procedures in place to deal with student complaints. The complaints process is channelled through the Programme Director and the Head of Department, the Head of the Department of Studies or even the Vice-Rector for Academic Affairs, if necessary. At the Professional Master Study Programme "Civil Engineering", students first solve problems with the Programme Director, thus the issues to be solved are addressed in a timely manner. For example, if the Programme Director receives a complaint from students about the inadequacy of a course or the incompetence of an instructor, the next step is to find out the reasons and attend the relevant lectures; if the students' complaint is justified, the instructor is instructed to improve the course or is replaced by an instructor whose competence is appropriate for the course.

- Academic personnel competence development:

Courses and seminars are regularly organised for academic personnel, both on pedagogical methods and on technological possibilities for improving the quality of courses and their own qualifications. RTU regulations stipulate that a member of academic staff should also deliver guest lectures at foreign universities, which also directly increases their abilities and the quality of communication. In 2021, RTU organised the following training for the personnel - training on the e-learning environment (Moodle), use of Zoom and Teams (which significantly increased the mobility of teaching staff due to the epidemiological situation), training on audio-visual systems for remote lectures, as well as regular trainings on RTU information systems (usage of ortus.lv). Any other type of training for elected academic personnel in their field is also supported.

- Teaching and learning methods:

Pedagogical methods, ways of teaching, learning and assessment are regularly evaluated. Topical issues are discussed at departmental meetings, at the meetings of the Methodological Council. At the end of the course, students evaluate the performance of each member of academic staff by completing a course evaluation questionnaire. Students have the possibility to apply for personal tutorials, which are organised either systematically every week or by appointment at fixed times. Some courses also use methods where students can self-assess and engage in group work to facilitate learning.

- Fostering student autonomy:

Studies rely on the student's autonomy, while at the same time providing guidance and support from the instructor - the description of each study course specifies the scope and content of students' independent work, as well as the methods of its assessment.

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

The Professional Master Study Programme "Civil Engineering" includes Practical Placement of 6 CP in Option 1 and 32 CP in Option 2.

Internship is an integral part of a professional study programme, which is to be done according to LR regulations, the resolution of RTU Senate of 29 April, 2002 "On the structure of the second-level professional study programmes" and the resolution of RTU Senate of 28 January, 2019 "On organization of internship at Riga Technical University, new edition".

The ***aim*** of the internship is:

The aim of the internship is to give students the opportunity to get acquainted with the basics of professional activity of a civil engineer, to deepen their knowledge and improve the skills acquired in the study courses.

A place for internship can be any company or organization, which allows acquiring the basics of civil engineer job related to construction project design, management, technology of construction materials, management of civil works, planning and supervision of civil works, project documentation, procedure of on-site works, experience in working with construction regulations and standards, planning of necessary activities for on-site quality control and labour safety, preparation and control of as-built documentation, supervision and analysis of the works, effective and appropriate use of resources, competence in issues of building operations, use of design software.

If students need it, RTU offers assistance of a student career specialist, who can find a suitable place of internship, but a student also can choose the place of internship individually, which is also the most popular way of finding a place for internship. After that a trilateral cooperation agreement is concluded and internship tasks are carried out during 6 (32) weeks, the agreement states contact persons – an on-site internship supervisor and an internship supervisor at the university. At the university, the internship supervisor is the programme director or other person according to the study plan. The internship supervisor at the university ensures assistance during the internship. Before presentation of the internship report, the internship supervisor at the university reviews it and gives their comments and feedback to the student so that they could amend the internship report and prepare better for public presentation of the report.

The internship has defined specific tasks to be carried out:

1) To familiarise oneself with the organisation and documentation of the construction company.

2) To become familiar with the social environment of the construction company and to be able to participate in the work team.

3) To familiarise oneself with the material and technological equipment of the construction company, to analyse the requirements of the technical description and the formatting guidelines of the information material.

4) To develop and improve professional skills of a civil engineer by performing practical tasks and applying the theoretical knowledge acquired during studies.

To get their internship assessed, a student presents the report, which states an internship supervisor's (representative of the internship partner company) assessment, internship diary, and defends the internship report within a certain term according to the study schedule.

Professional internship contributes to all learning outcomes, as it is one of the final stages prior to development of a Bachelor Paper including an engineering project. During the internship, a student has to demonstrate the knowledge defined in the study programme, apply their skills and demonstrate the acquired competences. Internship can provide better reflection of student's performance than individual study courses.

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/lv/studentuserviss/karjeras-centrs-ssc/karjeras-diena (In Latvian). 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 provision of internship places to students.

The internship in English is provided in almost any Latvian company, as many of the companies work in the international market or are multinational companies with branches in Latvia. As the language of the construction industry is drawings and the legislation is the Eurocodex, which is available in both Latvian and English, there are no obstacles to providing internships to foreign students. Foreign students can also do their internship in one of the laboratories of the Faculty of Civil Engineering, which has cooperation with companies in the sector and participation in international projects.

No distinction is made between the two internship options 6 CP and 32 CP as the outcomes are the same. The first option is implemented over a shorter period of time because the student has already had an internship at a previous educational level, while the second option has a longer internship period to achieve the same level of knowledge, skills and competences as in the first option.

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

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

Professional Master Study Programme "Civil Engineering" includes a final examination – Variant 1: a Master Thesis in the volume of 20 CP; Variant 2: a Master Thesis with engineering project amounting to 26 CP.

The final examination is a research project in the field of civil engineering - researching issues in the field, developing solutions and analysing the problem, as well as theoretical substantiation analysis.

At the final examination, a student should demonstrate their professional and research skills according to the professional standard and State Regulation on Professional Master Degree. The student should also attest their ability to design buildings and structures, carry out calculations of structures, use modern building materials and technologies, design a *planning* and *supervision project of on-site construction works,* draw up a paper according to the requirements for qualifications papers, present it in public in front of the committee and defend the solutions stated in the project.

The procedure of Master Thesis development includes approval of the topic of the Master Thesis and the engineering project with a scientific adviser and the head of the department. Students choose the fields of their Master Theses from the sample topics suggested by each department; accordingly, the head of the department suggests an appropriate scientific adviser for the Master Thesis competent in the chosen theme.

A student and their scientific adviser also agree upon the calendar plan, but each department has its own control terms, taking into account that both autumn and the spring academic terms consist of 16 academic weeks. Viva Voce Examinations are organised twice a year - at the beginning of January and the beginning of June. Prior to Viva Voce, the thesis is reviewed by the reviewer appointed by the head of the department.

It is also compulsory for the Master students to present their Master Theses at a conference organised by RTU, which promotes both the graduates' presentation skills and scientific orientation in the chosen theme of the Master Thesis.

The Viva Voce Examination is public, it is evaluated by the State Final Examination Committee appointed by RTU Rector, which includes both academic personnel and representatives of professional civil engineering associations and companies.

Examples of the themes of recent Master Theses:

- Implementation of Building Information Modelling (BIM) at a Construction Company in Latvia.
- Construction Technologies for Dome-Shaped Structures.
- Performance Analysis of a Hybrid Wood-Concrete Element Reinforced with Steel Tape.

- Long-Term Tensile Properties of Different Cement Composites.
- Long-Term Compressive Behaviour of Geopolymer Concrete.
- Passive Building Performance in Latvian Climatic Conditions.
- Project Management in the Latvian Construction Industry and its Integration in the Study Programme “Civil Engineering”.
- Examples of themes of foreign students:
- Effects of Low and High Temperatures on Concrete Properties.
- Investigation of the Technological and Structural Properties of Cement Composite with Cyclonic Ash and Steel Fibres.

- Multiparametric Ultrasonic Testing of Concrete Products.

Analysing the wide range of topics, it can be concluded that both teaching staff and students demonstrate their skills, knowledge and competences at a very high level and in line with the topicality of the field. The choice of topics is based on the student's interest in current developments in the field and on the student's preferences for future career choices, and the final thesis topics owe to the sustainability and development of the programme as a whole.

Master Theses assessment grades during the reporting period on average varied from 8.1 to 8.7. The breakdown is shown in the chart.

In 2020, 20 alumni graduated from the programme with an average grade of 8.7, 5 students received the top grade - 10; whereas grade 9 was awarded to 7 alumni, grade 8 – to 6 alumni, grade 7– to 1 alumnus, grade 6 – 1 alumnus. In 2019, 14 alumni graduated from the programme with an average grade of 8.3, 3 alumni received grade 10 grade; 9 was awarded to 3 alumni, grade 8 – to 5 alumni, grade 7– to 1 alumnus, grade 6 – to 2. In 2018, 20 alumni graduated from the programme with an average grade of 8.5, grade 10 was awarded to 7 alumni, grade 9 – to 3 alumni, grade 8 – to 4 alumni, grade 7 – to 5 alumni, and grade 5 – to 1 alumnus. In 2017, 19 alumni graduated from the programme with an average grade 8.1, grade 10 was awarded to 2 alumni, grade 9 - to 3 alumni, grade 8 – to 10 alumni, grade 7 – to 3 alumni, grade 6 – to 1 alumnus

3.3. Resources and Provision of the Study Programme

3.3.1. Assessment of the compliance of the resources and provision (study provision, scientific support (if applicable), informative provision (including libraries), material and technical provision, and financial provision) with the conditions for the implementation of the study programme and the learning outcomes to be achieved by providing the respective examples.

RTU Faculty of Civil Engineering (FCE) continuously monitors compliance to quality requirements of rooms and technical equipment, the appropriate lecture halls with necessary multimedia hardware have been equipped. In general, in the FCE building at 6A Ķīpsalas Street 4 computer rooms, 23 lecture rooms, 35 laboratory rooms are available for the needs of the study process. In order to ensure the qualitative study process, FCE is carrying out extensive refurbishment works, upon their completion the Faculty will meet international standards for campuses and lecture halls.

Classification of the premises is given in the table below.

Room type	Number of rooms	Useful area m²
Meeting room	1	70.91
Computer rooms	4	243.77
Auditoriums	23	1702.34
Teachers' rooms, cabinets	69	1523.61
Assistant professor / Doctoral student premises	5	196.24
Workspace / workshop	6	172.19
Research facilities	6	350.53
Laboratories	35	1256.83
Resource room	6	213.53
Auxiliary room	11	197.99
Anteroom	3	35.89
Student self-government and record keeping	3	260.43
Kitchen	1	16.43
Total		**6240.69**

The study process will be mainly provided by FCE academic and technical staff in cooperation with the following RTU departments:

- Department of Occupational Safety and Civil Protection;
- Department of Innovation and Business Management;
- Department of Social Sciences;
- Department of Languages for Specific Purposes.

FCE institutes provide education and learning support: develop and update descriptions of the study courses, implement the corresponding study courses (including practical and laboratory works and seminars), supervision and defence of the graduate papers, and other activities related to learning, teaching and research work.

In 2017 – 2020, substantial investments were made in the research infrastructure. For example, the Institute of Transport Engineering had acquired such equipment as a Hamburg testing device

(automatic Hamburg two-wheel tracker), as well as a roller-compactor, a four-point fatigue testing machine (four-point beam bending machine), a drone with infrared camera for open-air drone-based measurements and reading, as well as a high-resolution camera for additional imaging. In 2021, the Institute of Materials and Structures in cooperation with the largest manufacturer of construction materials in Latvia – "Sakret" Ltd., established a new laboratory – 3D concrete printing laboratory equipped with a 3m x 3m concrete 3D printer. In 2020, FCE founded the Centre for Digital Building Technologies that carries out active research and training in Building Information Modelling (BIM).

The Scientific Library of RTU (https://www.rtu.lv/en/studies/scientific-library) is an academic library of state significance, which has obtained its status as a result of library accreditation. The Scientific Library of RTU provides the necessary information for RTU study process and research activities, performs library, bibliographic and information services for RTU students, teaching staff, and employees. The Library's collection includes 1.4 million printed documents and e-resources in the databases relevant to RTU fields.

In 2016, significant investment was made in the development of the library infrastructure, with the construction of an additional 2240 m2 of space for the Central Library. The total area of the library premises is 6393 m2, of which 3417 m2 are for reader services. There are 713 workstations for library users. The library has four group rooms and six individual cubicles, a Western reading room and a conference room. The library is accessible to users with reduced mobility.

To improve the work of the Scientific Library of RTU and to ensure the availability of information needed for study and research work, the Library Council has been established, which decides on the replenishment of the library's collection with printed publications and subscriptions to the necessary databases. The Library Council has approved the "RTU SL Collection Completion Policy", which defines the basic principles of collection formation and development in accordance with the directions of RTU study and scientific activities.

When RTU provides funding for the library, the funding for information resources for each study programme is calculated. The collection is replenished according to the recommendations of the heads of study programme, researchers, and the allocated funding. The desired titles can be ordered by contacting the Library's Collection Development Department, ordering on the Library's website, filling in the order form, filling in the application form, by phone or by visiting the Library. The Scientific Library offers a guide to ordering titles and e-resources, which brings together the websites of various publishers and bookshops in Latvia and abroad.

Database subscription contracts are concluded both directly with the supplier and through the "Cultural Information Systems Centre" state agency, which is the Latvian national representative of the international non-profit organisation EIFL (*Electronic Information for Libraries*, http://www.eifl.net/). The EIFL Licensing Programme offers national libraries subscriptions to internationally recognised databases at significantly reduced subscription fees not offered to individual subscribers, thus saving financial resources of the libraries.

The database subscriptions maintained by RTU Scientific Library

(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.
- Databases financed by the Ministry of Education and Science available to RTU Scientific Library: ScienceDirect, SCOPUS (Elsevier), Web of Science.

- Latvian databases: LETA, Letonika, the Database of Latvian Standards (available on the premises of the Library).

Database usage at the Scientific Library of RTU has been growing since 2016. E-resource loans have increased from 75,391 to 525,194 items.

The new library premises have allowed to extend the range of services. Since the opening of the new premises in 2018, the number of visits to the library has increased from 103,825 to 235,600. The Scientific Library of RTU is open to everyone. The Central Library is open to users from Monday to Saturday. There is a 24/7 reading room. During the summer period, the Central Library is open every weekday with reduced opening hours. (https://www.rtu.lv/writable/public_files/RTU_library_general_info_2020.pdf)

The library's sources are housed in an open-access collection. Books and periodicals according to the field of study and the UDC indexes are located in the central building of the Scientific Library, 5 Paula Valdena Street, Riga. The last copies of the oldest publications corresponding to the RTU profile are kept in the library repository. They are always available to the users.

The librarian on duty helps visitors find their way around the collection. Bibliographers (information specialists) provide more detailed information and advice. The library has a branch librarian service (https://www.rtu.lv/lv/studijas/biblioteka/nozaru-informacija (In Latvian)).

The library resource search is supported by the Primo Discovery search tool (https://www.rtu.lv/lv/studijas/biblioteka/vienota-informacijas-meklesana (In Latvian))**.** It allows searching the library catalogue (https://kopkatalogs.lv/F/?func=find-b-0&local_base=rtu01 (In Latvian)), the subscribed databases, as well as databases created by the RTU Scientific Library (https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/bibliotekas-veidotas-datubazes (In Latvian)) in one interface. Searching for information in the electronic joint catalogue (https://kopkatalogs.lv/F (In Latvian)), it is possible to simultaneously obtain information on the resources available in 12 Latvian libraries. Both the electronic catalogue and the RTU portal ORTUS allow remote reservation of library resources, as well as remote access to the databases. Since the introduction of RFID technology, users can use five self-service book-dispensing machines and check out books from the pick-up machines around the clock.

The library provides students, academic personnel and other stakeholders with various levels of individual consultations and group training in information literacy (https://www.rtu.lv/lv/studijas/biblioteka/lietotaju-apmacibas (In Latvian)).

Publications not available in the library are delivered via an interlibrary loan or an international loan.

Internet access is available throughout the library. The library has copying, scanning, printing, binding services and a self-service dining room.

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

3.3.3. Indicate data on the available funding for the corresponding study programme, its

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

Both state budget financing and student funds will be used for the implementation of the study programme. Information on the expected financial resources of the programme is presented below:

Academic year	State budget funding for the programme, EUR	Tuition fees, EUR	Total study programme funding, EUR	Cost per student, EUR
2016./2017.	19 15 51,61	24 45,96	21 90 56,75	57 99,03
2017./2018.	26 62 84,92	4 00,00	29 92 96,64	60 60,99
2018./2019.	27 74 43,76	5 34,83	29 32 61,93	63 44,52
2019./2020.	30 82 47,10	-	33 33 78,22	66 07,56
2020./2021.	27 95 64,12	-	28 10 26,93	66 94,22

The analysis of the information shows that the state budget grants for the study programme have increased during the reporting period. The cost per student has increased, which is justified by the overall increase in total RTU costs (utilities, building maintenance, etc.).

Information on the minimum number of students in RTU study programmes is provided in the appendix of the self-evaluation report "On minimal number of students in study programmes".

Information on the funding distribution between the cost items is provided in the appendix of the self-assessment report "Funding distribution between the cost items".

The specific development of each study programme is the responsibility of each study programme director, as well as the faculty responsible. For the development of all study programmes, central funding is used for the renewal of the research library, improvement and maintenance of shared classrooms, public relations, programme marketing activities, development and maintenance of information systems related to the study process, development of the Ķīpsala complex and other activities.

In addition, see:

- Provision of study facilities in Part II, Chapter 3, Section 2.3.1.
- Provision of research facilities in Part II, Chapter 3, Section 2.3.1.
- Provision of information facilities in Part II, Chapter 3, Section 2.3.3.
- Provision of the material and technical base in Part II, Chapter 3, Section 2.3.2.

Provision of the financial basis in Part II, Chapter 3, Section 2.3.1.

3.4. Teaching Staff

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

General evaluation of the academic staff is provided by the information and CVs of the members of academic staff given in the study field report Criteria 3.5.-3.6. of Part II, Section 3. At this point, compliance of the qualifications and competencies of the involved academic staff to the requirements of the study course is considered.

The following qualitative and quantitative indicators show that the qualifications of the academic staff meet the requirements specified in Article 55 of the Law on Higher Education Institutions - 16 professors and associate professors, approved by the Latvian Council of Science, have been elected to academic positions in RTU departments and are experts in their field, participate in the implementation of the compulsory and the compulsory elective part of the study programme.

Academic staff regularly improve their professional and academic knowledge by participating in methodological seminars, conferences (national and international), conducting scientific and research work, as well as by participating in various projects.

Qualifications and achievements of the academic staff are described by departments, but not all members of academic staff of a department appear in the study programme outline. The outline is based on the load of academic year 2020/21, but the work during the reporting period and implementation of the study courses is not possible without all department staff involved, as they participate in facilitating the study processes, research activities, and graduate paper supervision.

The Department of Building Structures unites **11** academic staff members, including **3** professors, **2** associate professors, **5** assistant professors and **1** lecturer.

For example, Professor **Leonīds Pakrastiņš** is the author of more than 100 scientific publications and learning aids, and has presented papers at more than 50 international conferences. He is the supervisor of several Doctoral, Master's, Bachelor's and Engineer's theses. Expert of the Latvian Council of Science in the fields of Civil Engineering, Transport and Traffic. He has an extensive experience in preparing and conducting lectures and training courses. As the head of the technical committee LVS TC30 "Construction", he has organized the execution of the national implementation plan of Eurocodes standards and the development of national annexes, as well as the improvement of the technical regulation in the field of building structures. He holds European Commission JRC Centre instructor training certificates for EC2 and EC6 Eurocodes. Participant and manager of several national and international projects. Member of many conference programme committees and editorial boards of international journals. Member of the RTU Senate, expert of the Doctoral Council "RTU P-06". He has been awarded the titles of RTU Professor and RTU Honorary Employee for outstanding pedagogical and scientific activity.

Professor **Dmitrijs Serdjuks** has participated in more than 60 international conferences and

published more than 100 scientific and methodological papers. He is an expert of the Latvian Council of Science in the field of Civil Engineering. He is currently leading the research project "Method of correlation of coaxial accelerations in 6-D space for quality assessment of structural joints (COACCEL)" funded by the Latvian Council of Science, has participated in the international mobility programme "Visiting Professors Program, Peter the Great St. He has also participated in the International Visiting Professor Program at St. Petersburg Polytechnic University. Teaching, research, scientific activity and collaboration. 2019 - 2020". He has been awarded the titles of RTU Professor and RTU Honorary Employee for many years of conscientious and active work at the University.

Associate professor **Andīna Sprince** was awarded PostDoc grant and in May 2020 started her project realization. A co-author of 28 scientific, participated with reports at 27 international and scientific conferences, including 1 at a methodological conference. A. Sprince is a co-author of 1 Latvian patent and 7 teaching and learning aids. An expert in civil engineering in the Latvian Council of Science; has taken part in the implementation of projects guided by the Latvian Council of Science, Ministry of Education and Science and other institutions. A. Sprince raised her qualifications doing a 6-month internship at Technical University of Denmark. She is a member of editorial boards of many scientific journals. Last year she received an AFW Academy Certificate for project management. To improve her qualification, she regularly participates in different scientific and academic workshops. She works in the State Examination Committee of RTU Faculty of Civil Engineering and the Faculty of Architecture. She has been a supervisor for theses within different cycles – Doctoral, Master and Bachelor theses with engineering projects of students at the programme.

Assistant professor **Līva Pupure** was awarded a PostDoc grant, published 22 articles, including 9 conference articles and 2 book chapters (all of them are indexed in SCOPUS database), underwent the academic training course at Luleå University of Technology (Basic Course 1: The Teachers Role at Luleå University of Technology; Basic course 2: Developing as a University Teacher), as well as received an award from the society “Kungl. Skytteanska”, Sweden, as for a “young and promising researcher”.

Assistant professor **Vadims Goremikins** obtained a PhD degree in civil engineering from RTU Faculty of Civil Engineering, after that did post-doc research at the University of Edinburg and Czech Technical University in Prague for two years, where he investigated behaviour of composite structures under fire. The author and co-author of over 30 scientific publications, reported his research results at 25 international scientific conferences and participated in 6 scientific projects, the author and co-author of 10 methodological teaching and learning publications.

Lecturer **Andrejs Pupurs** received a PostDoc grant, published 36 articles, including 19 conference articles, and 1 book chapter (all of them indexed in SCOPUS database), completed the academic training courses at *Luleå University of Technology* (Basic Course 1: The Teachers Role at Luleå University of Technology; Basic course 2: Developing as a University Teacher).

At **the Department of Construction Mechanics,** there are **4** academic staff members involved in the implementation of study courses, including **1** associate professor, **1** leading researcher, **1** assistant professor and **1** lecturer.

Associate Professor **Jānis Šliseris** has co-authored more than 45 scientific publications and presented papers at more than 30 international conferences. He spent two years as a research fellow at the Fraunhofer Institute for Industrial Mathematics in Germany. Supervisor of Doctoral, Master's, Bachelor's and Engineer's theses. Expert of the Latvian Council of Science in Construction and Transport Engineering. Leader and chief executor of the international project ERANET ELAC2015/T02-0721 "Development of ecofriendly composite materials based on geopolymer matrix

and reinforced with waste fibers". Participated in several RTU, LCS and international (ERDF, ESF) scientific projects, the scientific results of which have been published in international journals and conference proceedings, co-author of 3 patents. The construction material developed by J. Šlisers and his team won the first prize at the International Invention and Innovation Exhibition MINOX. He was awarded the honorary title "RTU Young Scientist of the Year 2017" for outstanding scientific activity.

Associate professor and leading researcher at RTU, Institute of Civil Engineering and Reconstruction **Līga Gaile** is an expert in the Technical Committee of LVS TC30 “Civil Engineering”. Participated in the national plan of Eurocode standard implementation and elaboration of national annexes, as well as in elaboration of technical regulations for building units, certified by LR Ministry of Economics letter of recognition of 2015 for significant contribution. In the same year, the Latvian Association of Civil Engineers expressed their recognition in the nomination “Education and training of young civil engineers”, but in 2018 she was awarded a prize in the nomination “Best research paper, study book, publication in civil engineering and patent in civil engineering technology of the year”. As a whole, she is a co-author of 19 scientific publications. To improve her qualifications, she regularly participates in different scientific and academic workshops. She also received a PostDoc grant.

Lecturer **Līga Radiņa** is a co-author of 14 publications and has participated in 8 scientific projects. L. Radiņa took part in organization of IMST 2015 “Innovative Materials, Structures and Technologies”. Last year she received an international AFW Academy certificate for project management, but this year a licence for professional training “Project management using Agile, Scrum, Lean, Kanban”. Regularly participates in different training workshops on adult education. In 2019 received RTU SP prize as “The Lecturer of the Year” of the Faculty of Civil Engineering.

At **the Department of Computer Aided Engineering Graphics,** there are **4** teaching staff members, **1** academic, **1** assistant professor, **1** practical assistant professor and **1** lecturer.

The academic staff of the department has organized four international conferences on the topics of the courses taught by the department. All academic staff of the department has scientific publications, incl. SCOPUS quoted, on the issues related to the implemented study courses. All faculty members have obtained certificates of competency for CAD software taught to students.

Professor **Modris Dobelis** has nearly 2.5 years of practical experience at Westinghouse Electric Corp. (USA) in the development of AP600 nuclear power plant project as a trainee/CAD engineer, practicing 3D modelling of piping systems and equipment, isometric schemes and drawings. As a Fulbright Teaching/Research Fellow, **Modris Dobelis** has organised and led an international education and research project on the development of a quantitative assessment method for engineering graphics literacy with academic staff from 5 technical universities in 4 countries and hands-on involvement of about 100 students in the research. He has supervised two Master Theses on BIM related topics, and has been the supervisor of a six-month post-doc study and research project for *tenure track* candidate Silvia Titotto from the Federal University of ABC, Brazil. **Modris Dobelis** is a Corporate Researcher at the Graphics Literacy Education and Research Centre of the Faculty of Engineering of Kobe University, Japan, which organizes international collaborations in the field of engineering graphics, is an editorial board member of SciELO: Brazilian Archives of Biology and Technology Instituto de Tecnologia do Paraná - Tecpar, Brazil, is an article reviewer for "The Journal Biuletyn of Polish Society for Geometry and Engineering", Poland, and "Engineering Review" University of Rijeka, Croatia. **M. Dobelis** is a member of several international societies, e.g., Honorary Member of Alpha Pi Chapter North Carolina State University, the Board of Directors of Epsilon Pi Tau of the International Honor Society for Professions in Technology. He has participated in ERASMUS mobility activities at three Serbian universities and the University of Moratuwa, Sri Lanka. He holds a certificate in English at C1 level. He has obtained an international Certified

SolidWorks Associate (CSWA) level certificate for the CAD software taught in the course. **Modris Dobelis** regularly lectures to foreign students of RTU Summer School in Robotics. During the last six years he has participated in 6 conferences and published 16 scientific articles on the issues related to the delivered study courses.

Assistant Professor **Zoja Veide** has participated as a researcher in the international mobility programme "Development of Cooperation between Baltic Universities and Kobe University in the Field of Graphic Sciences" (funded by the Ministry of Education of Japan), as well as in the ERASMUS+ projects "Development of Interactive and Animated Drawing Learning Tools" and "Modern Method for Spatial Awareness with Augmented Reality Technology" (Senior Expert, Scientific Supervisor). In the last six years, she has participated in 18 conferences and published 6 scientific articles on the issues related to the delivered study courses.

Lecturer **Veronika Stroževa** has worked as a researcher on the implementation of augmented reality in teaching. She has participated in ERASMUS+ projects "Development of interactive and animated drawing teaching aids" and "Modern method for spatial awareness development using augmented reality technology". Within the project, she gave a public lecture "Educational Applications of Augmented Reality", as well as organised an online lecture "Online Lecture from Japan to Latvia" for students of Engineering High School of Riga Technical University and Riga Secondary School No. 40. In the last six years, she has participated in 11 conferences and published 6 scientific articles. She has a certificate of the right to perform pedagogical activity.

The Department of Civil Engineering unites **11** academic staff members, **1** associate professor, **4** assistant professors, **3** lecturers, **1** assistant and **2** research assistants. Academic staff regularly improve their professional and academic knowledge at methodological seminars, conferences (national and international), scientific and research work, as well as by participating in various projects.

Lecturer **Raivo Kalderauskis** received the award “Young RTU Academic Staff of the Year 2019”, “Faculty of Civil Engineering Academic Staff of the year 2020” and was recognized in the journal “Forbes 30 under 30, Latvia” for achievements in higher education within Civil Engineering Education Initiative Group (CEEI).

In 2020, DCE established the “Building Digitalization Centre” (BDC) headed by **Kristaps Ritvars Ronis** as its director. In the course of its activities, BDC organized free study courses “Building Information Technologies”, which contributed to establishment of cooperation with “Latvijas standarts” and “CMB Inženieru kompetences centrs”. Over 250 Latvian specialists in civil engineering received training within these courses. The courses consisted of three training modules: BIM modelling, BIM coordination and BIM information management.

In November 2020, the members of the Department of Civil Engineering, together with participants from Lithuania, Estonia and Finland, launched the project Virstem - Virtual Technology for Use in STEM, initiated by Tallinn Technical University (Tallinna Tehnikakõrgkool). The aim of the project is to develop an interactive Engineering Graphics course within two years, which will be freely accessible to all civil engineering students.

In the framework of the conference “Digitisation in Construction”, faculty members of the Department of Civil Engineering **Kārlis Kostjukovs**, **Kristaps Ritvars Ronis** and **Raivo Kalderauskis** organised a "Digital Construction Education Day" to explore the current situation at Latvian higher education institutions to support and promote digitisation in construction. The main guest was Professor Lamine Mahdjoubi from the University of the West of England, who has established a Master's degree programme in BIM at his university.

Kārlis Kostjukovs, the Head of the Department of Civil Engineering, participated in exchange with

the University of the West of England to gain knowledge about the implementation of Building Information Modelling (BIM) in the UK and its integration into the university environment. Kārlis Kostjukovs has been recognised as FCE Faculty Member of the Year 2018 and FCE Active Faculty Member of the Year 2018.

Associate professor **Māris Krievāns** authored various scientific articles, indexed in Web of Science and/or Scopus databases.

In 2020, assistant professor **Sandijs Mešķis** reported at “The 3rd International Conference of Continental Ichnology”, Germany, with the presentation titled “Three-dimensional methodology for photogrammetric reconstruction of ichnofossils”. He also authored a scientific article “Ichnofossil assemblages from the Pļaviņas Regional Stage, western part of the Main Devonian Field”.

At **the Department of Construction Production, 8** academic staff members are involved in the implementation of the study courses, including **2** professors, **2** associate professor, **2** assistant professors, **1** senior researcher and **1** researcher.

Professor **Mārtiņš Vilnītis** is actively involved in the work of the Latvian Association of Civil Engineers as the Head of the Education Section and also a member of the Board since 2015. In 2018 and 2019, he organised an international summer school "Sustainable Construction" in Riga and in 2020 he participated in the organisation of the 1st International Symposium on Sustainable Construction. From 14 January to 29 May 2020, Professor Vilnītis acquired new skills at professional development courses organised by CMB Engineering Competence Centre Ltd. During the training, he acquired knowledge on fire safety solutions for buildings, building management systems, building physics, modern technologies for various construction works, energy efficiency requirements, LVS standards, technical inspection and building supervision.

Professor **Viktors Mironovs** is the author and co-author of 12 scientific monographs, more than 300 scientific articles, 30 teaching and learning aids, several scientific and technical dictionaries and the holder of more than 30 Latvian patents. Professor Mironovs still participates in research work and in 2019 he published 10 scientific articles, indexed in Scopus database. Professor is the Head of RTU Research Laboratory of Powder Materials and is supervising 7 PhD Theses.

Assistant professor **Sanita Rubene** can reconcile her work as a building inspector at “Fabrum” Ltd. with the work of FCE lecturer, as a result, students obtain up-to-date and practice-based knowledge.

Leading researcher **Videvuds Ārijs Lapsa** has obtained confirmation for registration of 5 patents over the past 3 years - “The Fastening Construction for Windows in the Aperture of Heat Insulated External Wall and its Assembling Methods”, “Prefabricated Vault Construction and its Installation Process”, “Composite Fibre and pts Production Process”, “Civil Construction with External Prestressing” and “Suspended Staircase Structure”.

Associate professor **Vitālijs Lūsis** also received a *PostDoc* grant.

In 2021, with the support of the ESF project "Strengthening of academic personnel of higher education institutions in strategic specialisation areas ", FCE have recruited a visiting professor from the University of Salerno, **Michele Guida**, who has developed and is delivering the lecture course on "Radon Assessment and Management for Civil Engineering" specifically for FCE students.

Associate Professor **Baiba Gaujēna** has co-authored 19 scientific publications, participated in several scientific and international conferences, is the Head of the study programme "Civil Engineering", as well as is the member of the State Examination Committee for the Graduate Papers of the Faculty of Civil Engineering of RTU. She is a supervisor of graduate papers for students of different levels - Master's and Bachelor's with engineering project part. In 2018, she

received the FCE Student Recognition Award "Student Support 2018".

At **the Department of Composite Materials and Structures,** there are 4 academic staff members, **2** professors, **1** assistant professor and **1** lecturer.

For example, Professors **Andris Čate** and **Jevgenijs Barkanovs** are Corresponding Members of the Latvian Academy of Sciences and actively participate in the work of the Department of Physical and Technical Sciences.

Professor **Andris Čate** is the author of more than 100 scientific publications in the fields of composite materials, digital mechanics and optimization (Hirsch citing index - 18), and the Editor in Chief of the international scientific journal “Mechanics of Composite Materials”. He has led various national projects (Latvian Academy of Science, State Research Programme), as well as has been the RTU leader in many international projects (EU framework programme). “Scientist of the Year 2014” at Riga Technical University.

Professor **Jevgenijs Barkanovs** has participated in more than 30 international conferences and published 70 scientific articles (Hirsch citation index - 13). He is a member of the editorial boards of several international scientific journals and has lectured as a visiting professor at universities in both European and Asian countries. Professor Evgeny Barkanov has led several national projects (ERDF, ESF) as well as international projects (EU Framework Programme). He has received several RTU awards for outstanding achievements in science, teaching and organisational work.

Assistant professor **Pāvels Akišins** has participated in various national and international scientific research projects, and is the author of more than 20 scientific publications. In the framework of *Erasmus*+ mobility programme, he delivered lectures at TU Dresden.

Lecturer **Andrejs Kovaļovs** has a more than 20-year experience in the national and international scientific research projects. He participated in 20 international conferences, published 40 scientific articles, and is the author of one patent. In the framework of *Erasmus*+ mobility programme, he delivered lectures at TU Dresden.

At **the Department of Building Materials and Building Products, 11** academic staff members are involved in the implementation of study courses, including **2** professors, **1** associate professor, **4** assistant professors, **1** senior researcher and **1** researcher.

For example, Professor **Diāna Bajāre** is currently leading 3 research projects (2 national and one international) on the development of innovative construction materials and, in collaboration with SIA Sakret, she is developing 3D concrete printing technologies. She has participated in two international study/ teaching material development projects (H20H20, Erasmus +); participates in several international networking events and projects. In the last 5 years, she has presented papers at more than 10 conferences and published more than 45 scientific articles cited in Scopus database (H-index 16). She is currently a guest editor for several scientific journals and reviews about 10 scientific articles per year. At the same time, she supervises PhD Theses and peer-reviewed dissertations both in Latvia and abroad.

Professor **Aleksandrs Korjakins** received the honorary title "RTU Scientist of the Year 2019", certificates of recognition for many years of qualified training of young specialists and scientific work, a certificate for mastering the English language programme and B1 (intermediate) level compliance, and has regularly participated in seminars and advanced training courses. He has participated in 7 COST projects, as well as national and international projects such as ERDF, LCS and ESF funded projects, published a total of 10 patents and more than 180 scientific articles, of which 88 are indexed in SCOPUS and/or Web of Science, with a current h-index of 16. He has participated in more than 50 scientific conferences and in the Erasmus+ international mobility

programme, with exchange visits to Vilnius Gediminas Technical University, Lithuania, University of Malta, Malta, University of Structural Engineering & Architecture (VSU) "Lyuben Karavelov, Bulgaria.

Associate Professor **Genādijs Šahmeko** has received a Certificate of Appreciation for many years of qualified training of young specialists and scientific work, a Certificate of English language programme and B2 (intermediate) level compliance, has regularly participated in seminars and advanced training courses. He has published a total of 8 patents and more than 100 scientific articles, including more than 20 scientific articles indexed in Web of Science and/or Scopus databases in the last 3 years. He has participated in more than 40 scientific conferences and in Erasmus+ international mobility programme, with exchange visits to Vilnius Gediminas Technical University, Technical University of Dresden, Tallinn Technical University. (He has organised conferences of the Latvian Concrete Union and represents RTU on the Board of the Concrete Union).

Assistant professor **Ģirts Būmanis** was awarded the title of RTU Young Researcher of the Year 2021, participated at more than 10 conferences and published 43 scientific articles indexed in SCOPUS database and his current h-index 9 with 305 citings. Ģ. Būmanis received a PostDoc grant from 2018 to 2020. Currently, he and participates in the national and international projects, such as ERDF, LCS and ESF projects. Ģ. Būmanis participated in international scientific partnership projects, such as COST action, conducted research in research institutes of Estonia, Lithuania, Portugal and Slovenia. Ģ. Būmanis holed a certificate of the building inspector, as well as possesses good experience in lecturing and supervision of student papers. He has been a supervisor of two Bachelor Papers, one Master Thesis and one international Master Thesis. Currently he is a scientific supervisor of one PhD Thesis. His research interests are related to alternative binding substances, alkali activated materials, plasters, waste recycling, biocomposites and high-strength concrete.

Assistant professor **Māris Šinka** was awarded the title of RTU Young Scientist of the Year 2019, took part in more than 10 international conferences and published 30 scientific articles including 16 indexed in SCOPUS database. His current h-index is 6 with 102 citings, he is the author of two Latvian patents. M. Šinka received a PostDoc grant for 2020-2022, as well as took part in the National Research Programme and ERDF research projects. M. Šinka conducted research at Ghent University, Belgium, established and manages a 3D concrete printing laboratory.

The above information on each of the faculty academic staff, as well as the faculty academic staffs' biographies, demonstrate their high level of qualification and their ability to ensure the quality of the stage courses and the quality of the programme as a whole. Many of the lecturers are also active in the construction industry, which also helps to translate their practical knowledge and competences into achieving the objectives of the programme. The programme's academic staff contribute to the achievement of the learning outcomes through their qualifications and their knowledge and skills.

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

13 professors – Doctors of Science, whose scientific and academic qualifications corresponds to the regulations on the criteria for the election in the professor position, are involved in the implementation of the study programme.

4 elected associate professors – Doctors of Science, whose scientific and academic qualifications corresponds to the regulations on the criteria for the election in the position of an associate

professor, are involved in the implementation of the study programme.

Furthermore, 7 assistant professors, 3 lecturers, 2 leading researchers, 1 researcher and 1 researcher are involved in the implementation of the study programme.

During the reporting period, the changes were insignificant, although 5 members of the academic staff were involved additionally in the programme implementation. Analysis showed that this happened for a variety of reasons:

1. The associate professors and assistant professors advanced their qualifications over the reporting period and became professors or associate professors, respectively;
2. The academic staff took part in grant competitions, and received funds and opportunities to conduct the research in the field, thus changing their academic position to a leading researcher position;
3. New industry specialists were recruited to promote introduction of advanced technologies in the study courses; thus, lecturers and assistants came to work in the programme.
4. Retirement;
5. Termination of employment due to commencing work in the construction sector that offers a significantly higher salary.

The overall changes during the reporting are given in the table:

Academic position	Academic year 2016/17	Academic year 2020/21
Professor	13	13
Associate professor	4	4
Assistant professor	6	7
Lecturer	0	3
Leading researcher	1	2
Researcher	0	1

The table shows that the programme involves new qualified members of the academic staff, thus maximally adjusting the programme curriculum to the specifics and latest development in the sector.

Within the Faculty, targeted measures are taken to ensure that changes in the composition of the teaching staff have a positive impact on the development and quality of the study programme, as well as compliance with the requirements set out in the regulatory enactments. Changes in the content of the study programme and the addition of new study courses to the programme, which are more in line with the development of the field, have also successfully influenced the achievement of the programme objectives and the acquisition of new study courses.

Currently, RTU is implementing SAM 8.2.2 project on "Strengthening of Academic Personnel of Riga Technical University in Strategic Specialisation Areas" financed by the European Social Fund, one of the tasks of which is the renewal of academic personnel. The aim of the project is to strengthen RTU academic personnel in the areas of strategic specialisation in 10 study fields, including the study field "Architecture and Civil Engineering". The project activities are focused on three areas:

- Involvement of Doctoral students in the work of the academic staff at RTU,
- Involvement of foreign academic staff in the work of the academic staff at RTU,
- Improvement of the existing academic staff qualifications, including academic staff internship at an economic operator.

Within the project, academic staff have an opportunity to develop their competence at the courses in professional English, as well as specialized training courses.

In order to ensure and increase the impact of scientific activities and personnel development, RTU management signs an annual agreement with each RTU faculty, which sets specific quantitative indicators in the areas of studies, scientific activities and valorisation.

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

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

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

In the process of study programme implementation, close cooperation of academic staff takes place, which is also manifested in the following activities:

- Discussion of the results and quality of the reviews at the department meeting, discussing the evaluation criteria and ways to improve the quality of the graduate papers.
- Interconnection of lectures and practical classes, discussion of strengths and weaknesses

afterwards.

- Joint attendance of methodological seminars, which are held in an interactive way, where academic staff share their experience and discuss the latest scientific and professional trends, as well as psychological and pedagogical techniques and methods for improving the study process.
- Cooperation within the projects, where the experience gained is used by the academic staff in the study process.
- Joint study tours, where academic staff and students learn about current developments in the field and apply practical case studies in classroom sessions.

The student-faculty ratio at the study programme at the time of submission of the self-evaluation report is 92/30 or one member of the academic staff to 3 students.

Annexes

III - Description of the Study Programme - 3.1. Indicators Describing the Study Programme		
Sample of the diploma and its supplement to be issued for completing the study programme	RBGB0.zip	RBGB0.zip
For academic study programmes - Opinion of the Council of Higher Education in accordance with Section 55, Paragraph two of the Law on Higher Education Institutions (if applicable)		
Compliance of the joint study programme with the provisions of the Law on Higher Education Institutions (table) (if applicable)		
Statistics on the students in the reporting period	Annex 5_Mg.pdf	5. pielikums_Mg.pdf
III - Description of the Study Programme - 3.2. The Content of Studies and Implementation Thereof		
Compliance with the study programme with the State Education Standard	Annex 6_Mg.pdf	6. pielikums_Mg.pdf
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard or the requirements for professional qualification (if applicable)	Annex 7_Mg.pdf	7. pielikums_Mg.pdf
Compliance of the study programme with the specific regulatory framework applicable to the relevant field (if applicable)	Compliance the specific regulatory framework.pdf	Atbilstība specifiskajam normatīvajam regulējumam.pdf
Mapping of the study courses/ modules for the achievement of the learning outcomes of the study programme	Annex 8_Mg.pdf	8. pielikums_Mg.pdf
The curriculum of the study programme (for each type and form of the implementation of the study programme)	Annex 9.zip	9. pielikums.zip
Descriptions of the study courses/ modules	RBGB0_EN.zip	RBGB0_LV.zip
Description of the organisation of the internship of the students (if applicable)	Internship_Management_Procedure.pdf	Prakses_organizesanas_kartiba.pdf
III - Description of the Study Programme - 3.4. Teaching Staff		
Confirmation that the academic staff of the doctoral study programme includes not less than five doctors, of which at least three are experts approved by the Latvian Council of Science in the branch or sub-branch of science in which the study programme intends to award a scientific degree (if applicable)		
Confirmation that the academic staff of the academic study programme complies with the requirements specified in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions (if applicable)		

Geomatics (42581)

Study field	*Architecture and Construction*
ProcedureStudyProgram.Name	*Geomatics*
Education classification code	*42581*
Type of the study programme	*Professional bachelor study programme*
Name of the study programme director	*Jānis*
Surname of the study programme director	*Kaminskis*
E-mail of the study programme director	*janis.kaminskis@rtu.lv*
Title of the study programme director	*Asoc. profesors/Dr.sc.ing.*
Phone of the study programme director	
Goal of the study programme	*To provide bachelor's professional higher education and to prepare specialists corresponding to the requirements of the labor market in geodesy, surveying, cartography; to provide professional education in the subfield of geomatics; in accordance with the approved professional standards, a set of theoretical knowledge and practical skills corresponding to the requirements of professional higher education, which allows to start professional activities, as well as to prepare students for further studies in master's degree.*

Tasks of the study programme	*- to provide students with extensive, professional, practical education, enabling them to adapt easily to the labor market, as well as scientific research;* *- to provide students with theoretical and practical training appropriate to level 6 of EQI, enabling them to obtain the qualifications, as well as to continue education at Master study programs;* *- to ensure competitive education corresponding to the level of professional bachelor's studies, to prepare students for practical work;* *- to provide students with the necessary theoretical knowledge, as well as a set of practical skills and skills;* *- to develop skills and abilities in working with specialized software;* *- to develop skills in working with geodetic instruments;* *- to ensure the development and changes of the content of the study programme, the study process, scientific research work, in conformity with changes in the fields of quality management and conformity assessment, international practice, science and didactics practice;* *- to promote students' interest in further professional development;* *- to develop the research work of academic staff and students, to promote international mobility and participation in projects;* *- to ensure the acquisition of modern general knowledge, to develop thinking, to promote analytical abilities of students, to develop skills in solving professional problems and tasks, to develop projects that would allow graduates to participate in solving problems of economic activity;* *- to develop team-building and cooperation skills with professionals from different spheres, to provide opportunities for developing foreign language skills that will help in cooperation with colleagues from other countries.*
Results of the study programme	*Graduates of the study program are professionally competent:* *- knows the requirements of regulatory enactments, surveyor certification process;* *- is able to independently perform work tasks;* *- is able to plan and organize work, use different methods and technologies;* *- is able to conduct research in accordance with the level of professional bachelor studies;* *- to carry out scientific research and develop new forms and methods in geomatics;* *- is able to defend and substantiate the results of research work.*
Final examination upon the completion of the study programme	*Bachelor Thesis Including Engineering Design Project*

Study programme forms

Full time studies - 4 years, 6 months - latvian

Study type and form	*Full time studies*

Duration in full years	*4*
Duration in month	*6*
Language	*latvian*
Amount (CP)	*180*
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 Geomatics*
Qualification to be obtained (in english)	*Engineer in geodesy and cartography*

Places of implementation

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

Part time extramural studies - 5 years - latvian

Study type and form	*Part time extramural studies*
Duration in full years	*5*
Duration in month	*0*
Language	*latvian*
Amount (CP)	*180*
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 Geomatics*
Qualification to be obtained (in english)	*Engineer in geodesy and cartography*

Places of implementation

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

3.1. Indicators Describing the Study Programme

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

Professional Bachelor Study Programme "Geomatics", classification code 42581. Accredited by the decision of the Accreditation Commission of LR Ministry of Education and Science of 29 May, 2017 – accreditation certificate No. 2020/39.The recommendations made for improvement of the study programme in the previous period have been taken into account and the following amendments have been made:

- Aims and learning outcomes of the study programme have been revised in order to accurately describe the expertise, skills and competences.
- The process of updating professional standards will be completed in accordance with the planned works for the professions of the entire Construction Industry Profession Card. The changes made so far have been incorporated into the study programme and study courses.
- The content of the study course "Practical Placement" has been updated by improving the learning outcomes, which are consistent with the specific nature of the sector. A summary rating is used in the assessment.
- The study course "Fundamentals of Land Management" in the volume of 4CP has been implemented in English.
- The quality assurance system is implemented in the study programme by reviewing the learning outcomes periodically (once a year) and in accordance with the industry innovations, improving the content of the study courses. The study programme administration performs observation of the study courses. The results obtained are discussed at meetings of the organisational units and the Industry Committee meetings.

The introduced improvements and corrections to the study programme are comprehensively described in Annex 3 "Report on the Implementation of Recommendations for the Study Programme "Geomatics"".

Outlines and descriptions of the study courses are given in Annexes.

During the reporting period, the implementation options in the Professional Bachelor's study programme have been changed, as during this period no students were enrolled in the Part-time full-time studies and Part-time extramural studies and there was no interest in these study programme implementation options, which shows that the available Full-time and Part-time studies' options are relevant for the modern student and this fully ensures the required number of students in the programme and also ensures a quality study process and graduate knowledge.

Implementation of the study programme offers full-time and part-time extramural studies. The study programme is in Latvian in Riga.

3.1.2. Analysis and assessment of the study programme compliance with the study field. Analysis of the interrelation between the code of the study programme, the degree,

professional qualification/professional qualification requirements or the degree and professional qualification to be acquired, the aims, objectives, learning outcomes, and the admission requirements. Description of the duration and scope of the implementation of the study programme (including different options of the study programme implementation) and evaluation of its usefulness.

The **Professional Bachelor Study Programme "Geomatics"** has been developed in accordance with the Law on Higher Education Institutions of the Republic of Latvia and the Classification of Education of the Republic of Latvia.Minutes No. 6 of the meeting of the Tripartite Cooperation Sub-Council for Vocational Education and Employment on August 20, 2008. (Kartogrāfijas inženiera profesijas standarts (visc.gov.lv)

2 (visc.gov.lv) in Latvian).

The professional bachelor's study program "Geomatics" is implemented in lectures, practical classes, measurements - in previously prepared field landfills or in specially equipped geodetic measurement auditoriums, as well as in independent studies, learning the basics of geodesy and cartography and its connection with other relevant economic sectors. All study courses included in the study program are related to the goals and tasks of the study program “Geomatics”, as well as to the results to be achieved. When acquiring study courses, students must acquire knowledge, skills and competencies determined by professional standards. Analyzing the connection of the study program goals, achievable results with the information included in the study courses, achievable results, set goals and other indicators, and their compliance with the Cabinet of Ministers of the Republic of Latvia Regulation No. 512 “Regulations on the second level professional higher education state standard” August 26, it can be concluded that:

- The strategic goal of the study program is developed in such a way as to provide professional studies corresponding to the economic, cultural, national defense and security, as well as social needs, based on the theoretical foundations of the branch sciences, geodesy and cartography professions and applicable in practice;
- The content of the study program provides a set of knowledge, skills and competence in accordance with the 6th level knowledge, skills and competence of the framework specified in the Latvian education classification. The main parts of the program are: study courses; study practice outside the educational institution (in the text - practice); a state examination, a part of which is the elaboration and defense of a bachelor's thesis;
- The tasks of the study program are designed to educate students, ensuring the acquisition of a fifth level professional qualification in geodesy or cartography, which is in line with the 6th EQF level, as well as to promote their competitiveness in the changing working environment and international labor market.

The tasks of the study program are as follows:

- to provide students with a wide, professional, practically oriented education, which gives an opportunity to easily adapt to the labor market, as well as to carry out scientific research work;
- to provide students with theoretical and practical training corresponding to the fifth level of professional qualification, which gives an opportunity to obtain the qualification of a geodesist or cartographer, as well as to continue education in a master's degree;
- to create an opportunity for students to obtain a qualification closely related to their future work, to provide opportunities for the acquisition of theoretical knowledge and skills that

would allow graduates to start practical activities after completing the program, to perform the duties of a geodesist or cartographer;

- to ensure the acquisition of modern general knowledge, to develop economic and professional thinking, to promote students' analytical abilities, to develop skills in solving professional problems and tasks, to develop projects that would allow graduates to get involved in solving problems of economic activity;
- to develop the ability to work in a team and work with professionals in various fields, to provide an opportunity to develop knowledge of foreign languages, which would ensure the ability to cooperate with colleagues from other countries. The content and scope of the examinations correspond to the content specified in the subject programs and the requirements for professional qualification skills and knowledge. All conditions for obtaining credit points are described in the program of each subject.

The requirements of the professional standard (geodesy and cartography engineer), after their evaluation by the Construction Industry Expert Council, have been included in the Construction Industry Qualifications Framework and will be further developed. Consequently, additional changes and additions will be made to the descriptions of study courses.

The study system is designed in accordance with the Law on Education, the Law on Higher Education Institutions and the Law on Vocational Education, so that it maximally promotes the achievement of the goals set in the study programs and facilitates the fulfillment of tasks. The study system at the university is internally regulated by the documents regulating the relationship between students and the university and the documents regulating the course and organization of studies, which are available at the program administration and virtually on the RTU website.

The professional bachelor's study program "Geomatics" has been established in accordance with the Cabinet of Ministers regulations of August 26, 2014 No. 512 “Regulations on the Second Level Professional Higher Education State Standard” and the decision “On Uniform Requirements for Study Programs of Riga Technical University” adopted at the RTU Senate meeting on March 23, 2015. Volume of the program - the volume of the study program and its structural distribution is in accordance with the state education standard. The amount of the program and study courses is expressed in credit points.

Structure of the study program for obtaining the qualification of geomatics engineer geodesy and cartography

1. Obligātie studiju kursi – 91KP
2. Obligātās izvēles kursi – 41KP
3. Brīvās izvēles kursi – 10KP
4. Prakse – 26KP
5. Bakalaura darbs ar projekta daļu – 12KP

Total 180CP.

Analyzing the distribution of the study program, it must be concluded that in the study program 50% are Compulsory study courses, 23% compulsory elective study courses, 6% free elective courses. Professional practice outside RTU makes up 14%, but the final examination paper or bachelor's thesis with the project part - 7% of the total study program.

The professional courses of the branch together make up 84% of the total amount of the program.

The qualifications awarded in the study program are included in the ESCO (European Skills, Competences, Qualifications and Occupations) catalog, which is the multilingual classification of skills, competences, qualifications and occupations in Europe. The standard of the profession of

geodesy and cartography has been approved by the Cabinet of Ministers Regulations No. 125 of 13 February 2007 "Regulations on the Classifier of Professions, Basic Tasks and Basic Qualification Requirements Corresponding to the Profession and the Procedure for Using and Updating the Classifier of Professions".

The content of the bachelor's program is designed in accordance with these standards and meeting their requirements. At the beginning of studies, students receive a short informative material, which contains the most important information for the student about the organization of studies and practical implementation.

In order to ensure the achievement of the goals and tasks set for the program, compulsory study courses, general education study courses and common study courses of the field are acquired in the first and second study years, which form the basis for the acquisition of special knowledge and practical skills during further studies.

During the development of the standard of the profession of geodesy and cartography, the opinions were coordinated between future and existing employers and representatives of Latvia's largest universities, as the working group for the development of the profession standard included representatives from the Latvian Surveyors Association (LMB), Latvian Association of Cartographers and Surveyors representatives.

The nominal duration of studies in Geomatics in full-time studies is 4 years 6 months, part-time - 5 years. The total amount of the study program is 180 CP.

In accordance with the new version of the state standard and the decision adopted at the RTU Senate meeting on March 23, 2015 “On the unified requirements for study programs at Riga Technical University”, improvements in the study program structure have been developed in cooperation with employers and program advisors. as well as by making substantive changes in the study courses in order to ensure their compliance with the requirements of the modern life situation and the standard of the profession.

In order to meet the goals of the Latvian state's economic policy, the new labor market needs such an education and employment policy that would ensure the full use of human resources, thus creating a productive basis for economic growth.

The study content is reflected in the program of each study course. The content of the subject program of the study program “Geomatics” is reviewed once a year to update the content of the study course, taking into account the changes in the field and daily necessities, which are also provided by the study program of each study subject.

At the end of the study program “Geomatics” a professional bachelor's degree in geomatics and a fifth level professional qualification (6th EQF) - “Geodesy and Cartography Engineer” are awarded.

2018/2019 In the study year, a mapping has been performed, in which the whole interaction of the goals and results to be achieved with the requirements of the professional standard and the goals of the study program is analyzed. The analysis of this matrix allowed to find the places in the descriptions of study courses that need to be improved. When presenting the developed matrix or mapping, suggestions were received, which allow to improve the study courses.

Academic staff, whose study courses are included in the study plans of the autumn or spring semester of the given academic year in all higher level study programs in full-time and part-time studies, place subject plans in the ORTUS e-learning environment, which include lesson topics for all lectures and practical work. laboratory work, etc., as well as the conditions for obtaining a successful assessment in the study course, which describes all the requirements that a student must meet in order to obtain a successful assessment of the subject (for example, information on

planned tests and independent work assignments which may affect the assessment of the student 's work).

In order to ensure the interaction of knowledge, competencies and skills acquired by graduates in the development and implementation of study courses, special emphasis is placed on:

1) to reflect current problem situations in the content of the study program (at the level of lectures, practical work), incl. analysis of the real situation of the study program and provision of solutions within the content framework of the specific course;

2) for the use of modern teaching methods (solutions of specialized computer programs, use of a unified solution algorithm, solution-oriented methods, programming, etc.);

3) the integrity of the study course and the study program, i.e. developing an inter-course learning approach (for example, for the inter-course learning approaches of the study courses Higher Geodesy and Astronomy, using tools for determining coordinates, their interpretation, etc.);

4) for the improvement of study methods in cooperation with foreign experts (for example, Vilnius Gediminas Technical University) for a distance learning form, using the e-learning environment ORTUS of Riga Technical University (RTU).

Individual access for students is provided:

1) study materials are provided both in the form of handouts and electronic materials and presentations;

2) if necessary, the lecturer plans individual meetings and consultations with the student, because each lecturer has a consultation schedule, which students are introduced to in the first lecture, in the RTU ORTUS system lecturers must indicate possible consultation times and if the student needs consultations, apply for the relevant times, as well as contact information is available on the website of the Department of Geomatics: geomatika.rtu.lv;

3) the individual approach is observed in the selection of the applied teaching methods, analysis of individual topics and problems during lectures, practical work, laboratory work and seminars;

4) when choosing the topic of the bachelor's thesis, the student's wishes and the specifics of the work in the chosen specialization are taken into account,

5) intensive and regular electronic communication takes place both in the electronic mail, in the ORTUS environment and on the website.

When implementing the study program, its goal corresponds to the 6th level of the European Qualifications Framework (EQF) and the 5th professional qualification level of the Latvian Qualifications Framework (LQF) and is achieved.

During the implementation of the program, mutual feedback is regularly provided. Students receive regular feedback from the lecturers on the submitted tests, course, exam, study projects, reports, practice reports and presentations. In the middle and at the end of the study course, the lecturers can conduct a survey on students' satisfaction with the content of the course, their wishes, as well as listen to suggestions.

The Department of Geomatics of the Institute of Transport Infrastructure Engineering of the Faculty of Civil Engineering of Riga Technical University (RTU) is tightly cooperating with professional associations – Latvian Association of Surveyors, Latvian Association of Cartographers and Geodesists, which are active participants of the international organisations (associations) – the International Union of Geodesy and Geophysics (IUGG), the International Federation of Surveyors (FIG) and the Council of European Geodetic Surveyors (CLGE), and Latvia’s GIS Association

(LATGIS), which is a member of the European Umbrella Organisation for Geographic Information (EUROGI). The Department of Geomatics of the Institute of Transport Infrastructure Engineering of the Faculty of Civil Engineering at RTU has been an academic member of the International Federation of Surveyors (FIG) already since 1999.

These organisations set uniform requirements for professional qualifications which are introduced in the Bachelor study programmes in this sector, thereby creating a uniform level of geodetic and surveyor education throughout the European Union. The goals and objectives of the geomatic programme are aligned with the requirements of the profession jointly set by the aforementioned organisations in Europe and the world.

The professional Bachelor study programme focuses on educating and training specialists in the field of geomatics, with extensive expertise in engineering issues, for work at companies in different sectors and public administration institutions. The acquisition of skills and knowledge provided for in the study programme is ensured by academic and scientific staff at the European level (EU and Latvian experts in the fields of engineering), who are involved on a daily basis in the delivery of civil engineering solutions at the national and European level.

The professional Bachelor study programme “Geomatics” is unique in Latvia. There are no analogue programmes in the European Education Area. There are only a few similar programmes, and we believe that the competitiveness of the graduates of the programme is very high.

The title of the study programme, the awarded degree, professional qualifications, aims and tasks, as well as enrolment requirements are interrelated and compatible.

Performance measurements are the student learning outcomes and independently developed Bachelor Paper with significant theoretical relevance and practical application features, which include original scientific research results, demonstrate the competence to independently acquire, select and analyse information and use it to address geomatic (geodetic and cartographic) issues.

The Professional Bachelor Degree in Geomatics and Qualification of Engineer in Geodesy and Cartography are awarded after the completion of theoretical courses, the performance of internship tasks and the public presentation of the Bachelor Paper in front of the State Examination Commission.

The multisectoral approach applied to the implementation of the study programme allows students to apply the knowledge gained in theoretical parts of the classes in practical analysis and resolution of the specific practical issues, which enables them to maximise their integration into the real working environment. The implementation of the study programme focuses on the use of innovative technologies and their comprehensive assessment for sustainable economic development.

The results of the knowledge assessment of students at the professional Bachelor study programme “Geomatics” are discussed twice a year at the meetings of the Board of the Institute of Transportation Engineering. The results are also compiled and evaluated by the programme administration and they serve as a basis for further development of the study process. Regarding the quality of the Bachelor Papers and their public presentation, the State Examination Commission provides its feedback, submitting a report to the study programme administration with recommendations regarding the defended Bachelor Papers. Graduates of the study programme are able:

1) are able to start their individual career or continue studies pursuing academic or professional Master degree; - able to master geodesy and cartography related theories, consistent patterns and technologies;

- are able to demonstrate comprehensive knowledge of facts, theories and patterns, necessary for personal growth and development, civil participation, social integration and further education;
- know technologies and techniques needed for fulfilment of learning or work tasks;
- are able to plan and organize work processes using different methods, technologies, tools and materials for fulfilment of tasks;
- are able to find, evaluate and use creatively the information in learning or professional tasks and for problem solving ;
- are able to develop autonomously and improve their professional skills .

The study programme is professional; thus, it always offers learning field trips and exchange of practical information at the enterprises and practical classes to improve skills and competences of students according to the set learning outcomes of the study programme.

The study programme promotes implementation of the leitmotif of Riga Technical University (RTU) as defined in its 2021-2025 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 educated and trains European and global-level engineers – leaders: developers of new technologies.” (RTU_strategija_2021_2025_gadam_makets_26.10.2021_lv.pdf) in Latvian.

The study programme fully complies with the development aim of RTU Faculty of Civil Engineering – to become an internationally recognized leading Latvian educational, research and development institution in the field of civil engineering, providing high quality study process, internationally recognized research and sustainable innovation, commercialization and knowledge transfer for economic development.

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

The professional bachelor's study program "Geomatics" prepares highly professional specialists of engineering qualification - geodesists and cartography specialties - in state-regulated professions.

Saeima (enters into force on 20 July 2001) Article 32 of the Law on Regulated Professions and The Recognition of Professional Qualifications. Requirements for regulated professions in the field of land surveying and real estate valuation: **surveyor**

EuroGeographics Association, the Board of Surveyors The Council of European Geodetic Surveyors (CLGE) and Geometer Europas (GE) in order to raise the prestige of the surveyors profession and to assess the need for such professionals, conducted a study which showed that the labor market has a great demand for highly-qualified geoeducated staff, but, at the same time, requires a lot of effort at both national and European level in order to be prepare the best qualified professionals able to collect, process, analyze, and present spatial data and to apply innovative technologies and data processing techniques http://ec.europa.eu/social/main.jsp?catId=738&langId=en&pubId=7267&type=2&furtherPubs=yes and http://ec.europa.eu/social/main.jsp?catId=955&langId=en. Various spatial data sets are increasingly being used for decision-making, process modeling, and other purposes. The study

shows that there is a very noticeable gap between labor market demand and supply of specialists and institutions of higher education study programs.

An international experience developed throughout the studies open up good opportunities to apply the mastered knowledge and skills in Lithuania, Latvia and other EU member states and to be employed by multidisciplinary companies and organizations involved in the supply of consulting, planning and design services or different kinds of surveying or GIS applications. Graduates of common Bacherol programme would be specialists in demand at the State Land Service of Latvia. The State Land Service (hereinafter - “SLS”) is a governmental institution of the Republic of Latvia which was established in 1992 to implement land reform. SLS is in charge of real property object data accumulation and dissemination to institutions responsible for land management and supervision. Also graduates would be very welcome at the Latvian Geospatial Information Agency (LGIA), which is one of the leading institutions in the realizing of the national policy in the field of geodesy, cartography and geospatial information. Pursuant to the competence the LGIA cooperates with state and local authorities, with the NATO member states, with European Union institutions and competent international organizations, as well as provides to these organizations and to the public geodetic, cartographic and geospatial information. As well our graduates work at the Rural Support Service (RSS), which is state administration institution and operates under the supervision of the Ministry of Agriculture in accordance with the Law on Rural Support Service. The Rural Support Service is responsible for implementation of a unified state and EU support policy in the sector of agriculture, forestry, fisheries and rural development; it supervises compliance of the sector with the laws and regulations and fulfils other functions connected with agriculture and implementation of rural support policy. Besides that our graduates work at Latvian State Forest service, Maritime Administration of Latvia, State Joint Stock Company Latvijas Gaisa Satiksme (LGS), which provides to the users optimum Air Navigation Services in Riga Flight Information region, etc.

Graduates of the professional bachelor's study program "Geomatics" have access to further master's studies.

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

During the reporting period, **the Professional Bachelor Study Programme “Geomatics”** was implemented in Latvian on a full-time and part-time extramural basis.

Number of students:

Analysing the total number of students in the reporting period, it can be concluded that in 2014/2015 academic year, the number of students was 103; in 2015/2016 academic year, the number of students was bigger – 106, which was followed by reduction in the number of students (92 in 2016/2017 academic year, 89 in 2017/2018 academic year, 78 in 2018/2019 academic year and 66 in 2019/2020 academic year, but in 2020, a growth was observed – 69 students). This can be explained both by demographic indicators and by the reduction of the total number of students in the country, but, regardless of the fluctuations of the number of students, the number of state budget seats in the programme practically has not increased during these six years. Analysing the proportion of full-time and part-time students by years, it can be concluded that in 2014/2015

academic year, the full-time students constituted 78.64% of the total number of students and the part-time students – 21.36%. In 2015/2016 academic year, the full-time students constituted 80.19% of the total number of students and the part-time students – 19.81%. In 2016/2017 academic year, the distribution of these indicators was as follows – 79.35% and 20.65%. In 2017/2018 academic year, there were 83.15% of full-time students and 16.87% of part-time students.

In 2018/2019 academic year, the full-time students constituted 78.21% and the part-time students – 21.79%. In 2019/2020 academic year, an increase of the full-time students was observed, reaching 84.85%, but the number of part-time students decreased, constituting 15.15%. In 2020/2021 academic year, these figures were correspondingly 92.75% and 7.25%.

	2014./2015	2015./2016	2016./2017	2017./2018	2018./2019	2019./2020	2020./2021
nepilna laika	22	21	19	15	17	10	5
pilna laika	81	85	73	74	61	56	64

The reasons here can be a lack of clarity regarding sector-specific policies, stricter regulatory requirements, etc.

Analysing the proportion of full-time and part-time tuition fee paying students by years, it should be concluded that part-time students make up the majority of tuition fee paying students, i.e., part-time pay students constituted 78.57% in 2014/2015 academic year, 77.77% in 2015/2016 academic year, 76% in 2016/2017 academic year, 62.5% in 2017/2018 academic year, 89.47% in 2018/2019 academic year, but 90.90% in 2019/2020 academic year and 83.33% in 2020/2021 academic year.

Full-time students have difficulty in finding full-time jobs in the industry during their study years. There have been situations when full-time students switch from full-time studies to part-time studies after starting work. On average, this option is used by about 10% of the total number of full-time students per year.

Breakdown by the source of funding:

In 2014/2015 academic year, 72.8% of the total number of students were state budget financed students and 27.18% were tuition fee paying students. In 2015/2016 academic year, these figures were: 74.53% – state budget financed students and 25.47% – tuition fee paying students. In 2016/2017 academic year, there were 72.83% state budget financed students and 27.17% – tuition fee paying students. A similar situation was also observed in 2017/2018 and 2018/2019 academic years – 73.03% and 26.97%, and 75.64% and 24.36%, respectively. In 2019/2020 academic year, the ratio was as follows: 83.33% – state budget financed students and 16.67% – tuition fee paying students. In 2020/2021 academic year, the number of state budget financed students increased, reaching 91.31%, while tuition fee paying students accounted for 8.69%. The analysis concludes that the number of tuition fee paying students is significantly below the number of state budget financed students – at about 10 times. When surveying students, it was found out that if it were not

possible to receive a state budget seat, students would not choose these studies because it was not possible to cover the tuition fee in the current economic situation, particularly for those students coming from the regions. Some of the potential learners have been affected by the global pandemic. As a result of Covid-19, jobs have been lost, financial resources to be allocated to education have been reduced.

Studies of some part-time students are paid by their employers because students themselves do not always have sufficient financial resources to pay for their studies.

It should be noted that the study programme is implemented in Latvian; still one or more study courses are implemented in English each year, for example, in 2018/2019 academic year, the study course “Fundamentals of Land Management” for the 2nd year students was implemented in English.

The study programme is interdisciplinary and therefore students should study field-sppecific courses in order to acquire the knowledge envisaged by the occupational standard.

For a comparison of the funding sources by number of students and percentwise in the reporting period, see Annex 5.

Full-time students of the study programme are offered an opportunity to take part in the international student exchange programme Erasmus+.

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

3.2. The Content of Studies and Implementation Thereof

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

The Professional Bachelor Study Programme "Geomatics" is in line with construction trends in the EU and worldwide. The Department of Geomatics of the Institute of Transportation Engineering, Faculty of Civil Engineering (FCE), Riga Technical University (RTU) maintains close cooperation with the professional associations – the Latvian Association of Land Surveyors, Latvian Association of *Cartographers* and Geodesists, active participants of the international organisations (associations) - the International Union of Geodesy and Geophysics (IUGG), International Federation of Surveyors (FIG) and Council of European Geodetic Surveyors (CLGE), and the member of Latvian

Geospatial Information Technology Conference (LATGIS), which is a member of European Umbrella Organisation for Geographic Information. The aims and tasks of the study programme are coordinated with the guidelines set by these organisations with regard to common professional requirements in the world and in Europe. RTU FCE Department of Geomatics of the Institute of Transportation Engineering is an academic member of the International Federation of Surveyors (FIG) since 1999.

Establishing a common platform for professional qualifications requirements in the EU, the associations highlight the development of a uniform quality of education within Bachelor study programmes throughout Europe in the fields of geodesy, cartography and surveyorship.

The future vision of the professional Bachelor study programme “Geomatics” is pursued in the light of the views of students, employers, professional organisations and regional interests; it is in line with the RTU mission and vision, goals and objectives.

A person operating in the field of geomatics – geodesy, cartography and land management – must be competent in all professional matters related to the processing, analysis and interpretation of all types of measuring, geospatial data, according to the initially given or specified assignment.

The study programme “Geomatics” is a programme open to cooperation that takes into account the goals and objectives of higher education, as well as regional and national interests related to the needs of students and employers.

Each year in October, the study programme administration submits a report to the boards of the professional associations involved regarding the study programme, its study courses and their content. When required and following assessments of the industry experts, additions and changes are introduced to the content of study courses in compliance with the industry and labour market development tendencies.

Each member of the academic staff involved in the programme has a sufficient and up-to-date number of scientific publications on the subject of the lectured course.

Since the previous accreditation, the content of the study programme has been updated to be topical, complementary, consistent with the goals of the programme and ensuring achievement of the learning outcomes, as well as to correspond to the needs of our industry and the latest scientific trends and innovative practical solutions.

In academic year 2014/2015, the content of the study programme was improved in line with contemporary trends and requirements of occupational standards. In line with the new version of the state standard and the decision of the RTU Senate meeting of 23 March 2015 on “Joint Requirements to Study Programmes of Riga Technical University”, improvements in the structure of the study programme were made in cooperation with representatives of employers and programme advisers, supplementing it with new study courses, as well as making substantive changes to study courses, in order to ensure their compliance with the market demands and the requirements of the occupational standard.

The content of the study programme is improved in cooperation with the professional organisations of the industry – Latvian Association of Surveyors, Latvian Association of Cartographers and Geodesists, so that students could acquire comprehensive knowledge in the fields related to geomatics, to be able to use it in practice, to be competent in analysing information independently, taking decisions and understanding professional ethics.

The programme provides students with professional knowledge in respective fields of specialisation, educating and training comprehensive and professional specialists in the industry.

Each academic year has 2 semesters, each semester lasts 20 weeks – 16 study weeks and 4-week examination period. Part-time studies at the University are organised in accordance with RTU Senate decisions and administration orders.

Riga Technical University is state-founded derived public person with the right for self-government. Its development strategy determines the role of the University as a higher education and research institution in the society, its mission, vision, goals and objectives.

When elaborating the Development Strategy of RTU, being aware of the role of the University in the growth of the Baltic Sea region and the development of Latvia's future, the priorities of the European Union have been observed, as well as the guidelines of the education and innovation policy planning documents at the national and regional levels.

The study programme is in line with the basic premise of Riga Technical University (RTU) as defined in its 2014-2020 Strategy:

- To ensure implementation of the leitmotif of the National Development Plan 2014-2020. RTU positions itself as one of the cornerstones of the development of Latvia, which educates and trains the specialists necessary for the necessary national economy of Latvia, as well as development of goods and services, providing the basis for sustainable development of Latvia. RTU Strategy includes essential principles for RTU development in the period until 2020, as well as determines the activities to be performed and authority sharing in their completion.

In order to accomplish RTU vision until 2020 - to become one of the leading universities of science and innovation in the Baltics, three aims of the University are defined in the Strategy:

- high-quality higher education, excellence in research, sustainable innovation and valorisation. Definite performance indicators are set for these aims;
- successful implementation of the development strategy of RTU forms the basis for creation of knowledge-based society in Latvia. RTU is one of the most significant partners in achieving the strategic goal of the Latvian National Development Plan – education and knowledge for growth of the national economy and technological excellence.
- RTU mission is to ensure internationally competitive high quality scientific research, tertiary education, technology transfer and innovation for Latvian national economy and the society.

The aim of the high-quality study process is to ensure prestigious, internationally recognised high-quality studies that train internationally competitive, analytical and creative specialists who ensure growth of Latvian national economy and who are able to participate in lifelong learning. The aim of excellent research is high quality scientific research to match the demand of Latvian national economy and international economy, with comprehensive involvement into international, state and field research programmes and integrated in the study process. The aim of sustainable valorisation is efficient technology transfer and innovation development environment to promote creation of new technology businesses and products.

At the regional level in Latvia, in order to meet the requirements of the Energy Charter, there are also specific opportunities determined for qualification upgrade (lectures and seminars), in which the topics have been adapted to these requirements, as demonstrated by the joint cooperation with the Ministry of Economics and the Ministry of Environmental Protection and Regional Development of the Republic of Latvia during the period of 2009-2014, within the framework of which lecturers are both representatives of the aforementioned ministries and foreign specialists.

Thus, for instance, in April-March 2014, guest lectures were held for both students and academic staff on construction, renovation and reconstruction topical issues in the EU conducted by Andrzej

Czemplik from Wrocław University of Technology.

At the same time, in February 2016, a seminar “Construction Law and Cabinet Binding Regulations” was organised to help students in the development of their graduation papers. The study process is organised in such a way that the themes of student study projects and research papers include issues relevant to the sector. The study programme is being supplemented and updated in the course of its implementation on the basis of labour market studies and consultations with employers and practitioners.

In September 2017, all students took part in a fascinating guest lecture “Near-field Spacecraft VLBI Tracking in the Context of Space Geodesy” delivered by Professor Leonid Gurvits from Delf University of Technology, the Netherlands.

In November 2019, RTU Department of Geomatics organised a seminar-discussion “2D-3D-4D GIS” held within the framework of the International GIS Day. A possibility of participating in the event was provided to the students, academic staff, and stakeholders. The seminar speakers were representatives of GIS companies, recognised in Latvia and internationally, who spoke about the possibilities of various dimensions in the GIS environment and their contribution to different sectors. In the discussions part, these and other representatives from the academic environment and the Latvian GIS Association (LATGIS) could be heard answering questions of interest to the participants about the opportunities and development of GIS.

On 24 May 2019, an erudition contest “Geomatics Competition” was organised for the study programme students. The goal of the contest was to provide students with an opportunity to demonstrate their knowledge, skills and inventiveness through competition, as well as to consolidate knowledge, understanding and conviction regarding application of their geomatic knowledge, and to build teamwork, friendly competition among students and cooperation with the academic staff. The erudition contest included theoretical and practical tasks in the field of geomatics that encompassed mathematics, astronomy, cartography, geophysics, geodesy, land surveying, remote sensing, GIS, photogrammetry, as well as general issues on the geomatic sector related to its history.

In November 2020, within the framework of the International GIS Day, a seminar and discussions were organised at RTU Department of Geomatics, this time remotely, devoted to academic and professional development of GIS in Latvia. The event aimed at educating both the students of the study programme “Geomatics” and students of other fields about how geographic information systems had come to our society, how long Latvian specialists had been engaged in GIS, how much they had achieved and what opportunities they could see in the future. This time representatives of several Latvian universities were invited to the seminar to talk about GIS growth during the period since it came to Latvia, what projects had been performed and what new heights they would like to achieve in this field. In the discussion part, the universities and the representatives of the Latvian Association of Surveyors considered the role of GIS for the specialists operating in the geomatics sector, evaluated benefits of GIS and explained why it should be learned.

Guest lecturers from different Latvian enterprises also regularly participate in the study process. To deliver some study courses, apart from the academic staff, professionals of the industry are attracted, for example, a practical part of the study course “Fundamentals of Geomatics” was conducted by representatives of Ltd. Metrum or Ltd. GeoStar; the study courses “Cartography” and “Geographical Information Systems” were delivered by representatives of Ltd. SunGIS and Ltd. Envirotech; some courses reated to geodesy were delivered by representatives of Ltd. GPS partners, Ltd. GeoStar and other employers related to the field of geomatics.

Students have an opportunity to visit enterprises of the industry and scientific institutes for the

study purposes.

During the annual field trips organised by Assoc. Professor J. Kaminskis to the Institute of Astronomy in the Botanical Garden (Riga), students have an opportunity to get familiar with the brightest scientific pioneer, laser technology (SLR) and time measurement tools in Latvia and the world. There is also the exact point or benchmark of the state gravity of the Republic of Latvia.

Students regularly present their research results at student scientific and technical conferences. In 2015/2016 academic year, students participated in the 57th Student Scientific and Technical Conference of RTU, presenting their research results in improvement of geomatics. In 2016/2017 academic year, students of the programme participated in the 58th Student Scientific and Technical Conference of RTU with presentations related to the selected field of studies. The scientific head of the section was Dr.sc.ing., Assoc. Prof. Jānis Kaminskis and the Scientific Committee consisted of Dr.sc.ing., Assoc. Prof. Māris Kaļinka, Dr.sc.ing., Assoc. Prof. Jānis Zvirgzds, Dr.oec., Assoc. Prof. Armands Auziņš, Dr.sc.ing., Prof. Eimuntas Paršeliunas, Dr.ing., Assist. Prof. Jūratė Sužiedelytė Visockiene.

In academic year 2017/2018, the tradition was continued, when the programme students participated in the 59th Student Scientific and Technical Conference of RTU with presentations related to the selected field of studies and the respective study courses. Bachelor students had 12 presentations on the challenging issues for the industry. Students of the study programme regularly receive awards for best presentations. This tradition continues in every year of study. In 2020/2021 academic year, students participated in the 62nd Student Scientific and Technical Conference of RTU. Mission of the professional Bachelor study programme “Geomatics” is to provide the Latvian economy and society with internationally competitive high-quality scientific research, higher education, technology and innovation transfer, as well as educate and train high-quality specialists in the field of geomatics that are in high demand and competitive on the international labour market.

RTU vision: Riga Technical University – a modern and prestigious University, internationally recognised as the leading University of science and innovation in Europe – a cornerstone of the development of Latvia. Vision of the professional Bachelor study programme “Geomatics”: The possibility for everyone to provide the required geospatial measurements based on professional knowledge of technologies from the ground and from space, as well as analysis and visualization of their complexes, ensuring high quality training and growth of Latvian and foreign specialists; regularly, together with state institutions and entrepreneurs, to resolve issues related to geomatics, promoting their development. The vision of RTU: Riga Technical University is a modern and prestigious internationally acknowledged university as a European centre of studies, scientific research and innovations – a cornerstone of Latvia’s development.

The Development Strategy of RTU serves as a basis for elaborating the University development programme and drawing up the investment plan of the annual strategic development projects, which are implemented using the budget of Riga Technical University and the attracted funds – financing from the State, European Union structural funds or other financial resources. Implementation of the investment plan ensures achievement of the objectives set in the strategy. RTU Senate approves the procedure for monitoring the process of introduction of the Development Strategy and supplements or amendments are introduced. Monitoring the Development Strategy and the results-oriented management system motivates departments and employees to achieve the objectives set out in the Development Strategy.

The future vision of the professional Bachelor study programme “Geomatics” is implemented with account of the opinion of students, employers and professional organisations, regional interests and in compliance with the RTU mission and vision, goals and objectives.

The study programme “Geomatics” is open for cooperation, taking into account the goals and objectives of higher education, as well as regional and national interests related to the needs of students and employers.

RTU development is planned regularly, including an integrated perspective financial programme, guaranteeing the achievement of the aims of the programme and management of possible risks, including demographic ones. There is a development programme, together with a concrete action plan aimed at ensuring sustainability, both at RTU as a whole and in the relevant field of studies.

Representatives of employers regularly participate in the State Examination Commission of the Department of Geomatics to provide an assessment of the knowledge acquired by students of the study programme. By participating in the State Examination Commission, industry representatives are able to make their proposals on the desired themes of students’ research that are topical in the labour market and are taken into account in other years of study.

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

Not applicable

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

The Professional Bachelor Study Programme “Geomatics”. Democracy and a dialogue with students are one of the core principles of the study programmes of the Faculty of Civil Engineering of Riga Technical University, as well as students are actively involved in the study process improvement. Students can take part in improvement of the study process directly – by expressing their wishes to the instructor of the specific study course, heads of departments, head of the study programme or with the help of representatives of Student Self-Government who are members of the Council of the Faculty of Civil Engineering, RTU Senate and RTU Senate commissions, as well as RTU Academic Assembly.

The study programme administration reckons that relations of the Faculty of Civil Engineering with students are characterised by mutual trust, cooperation, respect and honesty that promote understanding, correct perception and ability to use knowledge in practice.

To ensure the principle of democracy, the work of professors, assistant professors, lecturers and guest lecturers is evaluated by students at least once a semester by replying anonymously in the ORTUS environment to questions of the survey. In the ORTUS environment, RTU Study Department conducts surveys of the portal users and different questionnaires regularly, including assessment of the academic staff work at least twice during a study year. Students can thus provide feedback on the quality of the study courses and the professional performance of the academic staff. Questionnaires include questions on the availability of study materials for a particular course, instructor evaluation criteria, culture and quality of work, observation of rights of students during the course, the time spent on the student's own work and the study discipline. The final part of the questionnaire is intended for student proposals and initiatives to improve the quality of the study course and the instructor's work. The questionnaires are completed anonymously so that the responses provided are not likely to affect attitudes of an instructor towards a given student or a group of students and the goal of obtaining an objective assessment of students is reached. Still, it has to be acknowledged that not all students use this opportunity.

In order to ensure a link among students, academic staff and the programme administration, the Student Self-Government of the Faculty of Civil Engineering, which actively participates in all these processes and carries out the annual evaluation of academic staff, plays an important role. The annual Pride Award of the Faculty of Civil Engineering has been created to honour the best academic staff, which is a student event to assess the work of the academic staff.

The didactic concept of the study programme is based on the use of the latest and most advanced teaching methods. It provides for the development of the content of studies and a study organisation which ensures the sequential and in-depth acquisition of the knowledge provided for in the study programme and aims to address real practical examples and challenges, and an in-depth study of theoretical and practical issues in the field of geodesy and cartography. This includes knowledge acquisition stimulating methods, interactive cooperation among students, instructors and internship supervisors, as well as free debates in a multicultural environment. The programme uses training methods such as group work, situation analysis, seminars, discussions, field trips to industry companies and facilities to learn and consolidate the study material in an appropriate working environment, lecturing through PowerPoint or other presentations.

In addition to the theoretical courses in the university premises, learning trips to industry enterprises and organisations in Latvia are organised. Learning trips are organised both to promote in-depth acquisition of a theme within a definite study course and as thematic trips.

Field trips and study visits ensure that the content of the study programme is linked to the specific nature of the sector, students acquire not only theoretical knowledge but are able to link it to daily situations in industry companies, analyse problems and reason their views.

The programme uses the Ortus interactive e-learning environment of RTU based on the Moodle platform, which is regularly used by students, academic staff and guest lecturers of the study programme. In the Ortus portal, the student has access to all up-to-date information in the course of the study process. It contains current study courses (annotations, requirements for successful completion of the study course, plan of lectures, lecture and practice materials, required references, etc.), information on students' achievements and completed study courses, current reports, library information, access to teaching and scientific literature and databases, e-mail, etc. In the e-learning environment, academic staff places different tests and tasks for self-control of the student's knowledge, as well as the system allows for the creation of different interim tests and credit tests. Within the Ortus framework, it is possible to communicate with the academic staff members, and also with groupmates as part of current courses. The portal has discussion forums, regular surveys on the content, quality and academic staff of study courses, presentations, and

other audio, video and technical aids.

In order to ensure achievement of the learning outcomes in the study process, students are presented the aims, tasks and learning outcomes to be achieved, as well as the assessment requirements, both at the beginning of the first study year and at the beginning of each study course. Students know in good time the criteria for evaluating examinations, tests and other works in accordance with RTU Study Regulations.

General distribution of evaluation is specified in the description of each study course.

Contents and volume of the tests corresponds to the specifications of the curriculum of the study course and requirements towards professional skills and knowledge. All requirements for obtaining credit points are described in the syllabus of each study course.

The main assessment principles within the study programme are:

 the principle of summing up positive achievements;

- the principle of mandatory evaluation;
- the principle of openness and clarity of evaluation criteria;
- the principle of diversity of forms of assessment;
- the principle of availability of evaluation.

The quality of the education to be obtained is monitored by using surveys of graduates, employers and students of the professional Bachelor study programme “Geomatics”, results of examinations and tests, assessment of study papers and projects, internship reports and Bachelor Papers.

The main evaluation platforms of mastering the programme is examination and credit test to be passed at the end of each study course. The examination form is set in the study programme.

The assessment of learning outcomes is performed in accordance with Regulation on the Assessment of Learning Outcomes ((https://www.rtu.lv/writable/public_files/RTU_1_studiju_rezultatu_vertesanas_nolikums.pdf)in Latvian) and Regulation on Final Examinations at Riga Technical University ((https://www.rtu.lv/writable/public_files/RTU_nolikums_par_noslguma_prbaudjumiem_.pdf)in Latvian).

Teaching methods, structure of study courses and evaluation methods are selected by the academic staff responsible for the study course, according to the specific nature of the course and programme, as well as the needs of students.

Training courses and seminars on the latest teaching and pedagogical methods are organised for academic staff, as well as they are promoted to attend qualification upgrade courses, both at internal events of the Faculty and at RTU level, nationally and internationally. RTU Academic Excellence Centre organises activities for the professional development of academic staff at the university level.

Academic staff informs students about the specific assessment criteria of each study course at the first lecture, as well as they are published on the course page in ORTUS e-learning environment.

Bachelor Paper comprises a practical research in geodesy, cartography or land management with a part of the project in the relevant specialisation, in which a specific project is carried out with all the necessary practical measurements and calculations, linking as far as possible to the place of the student’s internship.

Students are able to demonstrate basic and specialised knowledge of professional activity and critical understanding of that knowledge when developing their Bachelor Paper, with a share of

knowledge corresponding to the highest level of achievement of the field or the latest scientific knowledge.

Bachelor Paper is publicly defended for the evaluation of which the State Examination Commission is appointed by the RTU Rector, consisting of a broad representation of future employers and representatives of other universities. Bachelor Papers are evaluated by reviewers approved by the Dean of the Faculty of Civil Engineering.

The principles of student-centred education are also taken into account in the implementation of the study process.

1. Student involvement in the study process and its development

RTU has developed procedures that offer students the opportunity to provide feedback on the quality of the study process (surveys, regular meetings with the programme director, etc.) Therefore, students have an opportunity to influence their study process.

Students under the programme are regularly involved in evaluating the quality of study programmes, participating in decision-making bodies and advisory bodies, and are also involved in writing a self-assessment report.

2. Learning outcomes

The evaluations of study courses and the number of credit points of the programme relate to the learning outcomes and students are informed about these. Academic staff associate the learning outcomes of the course with that of the study programme and reason the need for mastering the information of this course for mastering the respective profession.

Exam and test are the main forms of assessment within the study programme, which shall be passed at the end of each study course. The exact mode is specified in the description of the description study course. Assessment of learning outcomes is performed in accordance with the Regulation on the Criteria for Evaluation of Learning Outcomes

((https://www.rtu.lv/writable/public_files/RTU_1_studiju_rezultatu_vertesanas_nolikums.pdf)in Latvian) and the Regulation on the Final Examination at Riga Technical University ((https://www.rtu.lv/writable/public_files/RTU_nolikums_par_noslguma_prbaudjumiem_.pdf)in Latvian).

3. 3. Mobility

Mobility resources are used in the study programme to improve the pedagogical process of higher education, as the student-centred educational approach is based on a strong pedagogical process. Foreign university academic staff are involved in the implementation of the study programme, for example, a 2-hour guest lecture on “Geodetic Works and Coordination Base: Latvia and Lithuania”, led by Eimuntas Paršeliunas from Vilnius Gedeminas Technical University, Lithuania, has been conducted in the framework of the study course “Fundamentals of Geomatics”.

Thus, not only students, but also the academic staff involved in the implementation of the programme take advantage of the good practices that can be shared by guest lecturers.

4. Social dimension

The study process is flexible enough to connect work/family life with studies. This is demonstrated by the graduate survey results, which indicate that nearly 95% of students already work during studies. It is a positive point to mention that the premises of RTU Library are available to students 24 h and also on holidays.

5. Teaching and learning methods

Different teaching and learning methods are used in the implementation of the programme. For example, study projects are being developed, group works and seminars are taking place, and some study courses use a method that allows students to assess and learn from each other. There are also regular field trips and guest lectures. Students are invited and participate in international professional competitions, such as International GIS Days organised at higher education institutions of Kaunas, Lithuania. Students have the opportunity to receive individual tutorials with academic staff, including e-learning environment communication, Zoom, WhatsApp, etc.

6. Learning environment

Cooperation between librarians and academic staff is underway in the course of the programme with a view to improving the teaching and learning process. Students are presented with the resources and databases available in the library. Similarly, both academic staff involved in the programme and students are provided with access to research and learning in suitable premises with adequate equipment. Both students and academic staff may use department laboratories with different databases for the process of developing their research papers.

7. Academic personnel competence development

The academic staff involved in the programme is provided with regular opportunities for the development of their methodological and didactic skills. Teaching methods, structure of study courses and evaluation methods are selected by the academic staff responsible for the study course, according to the specific nature of the course and programme, as well as the needs of students.

Training courses and seminars on the latest teaching and pedagogical methods are organised for academic staff, as well as they are promoted to attend qualification upgrade courses at internal events of the Faculty, at RTU level and internationally. RTU Academic Excellence Centre organises activities for the professional development of academic staff at the university level.

The development of competences for academic staff also includes discussions on the use of teaching and learning methods, including innovative teaching methods. Within the framework of international ERASMUS+ projects and Nordplus projects, academic staff are involved in the development of new study courses, share experience in the use of study methods, materials and programmes with representatives of different European universities.

8. Extra-curricular student activities

The programme administration supports activities of the Student Self-government and encourages students to engage in it, thereby allowing students to develop their own self-consistency by providing students with an opportunity to implement their ideas, as well as opportunities for additional learning outside lectures. Students' desire to develop their ideas in project competitions, business incubators, use the RTU Design Factory capabilities for prototype development and many other options are also supported.

All students of the programme are offered opportunities to engage in out-of-study activities (Self-government, dance collective, choirs, debate associations, theatre studio, etc.). All this points to the active out-of-study life of students and the opportunities for such activities for students.

Students in the geomatic industry have a variety of erudition contests, such as "Are You the Surveyor No.1?" and "Geomatic Competition", which help students find out different aspects of the geomatic industry by interacting in friendly competition. The events take place on the scale of the Department of Geomatics, where it is possible to engage in the event in various mixed teams, as

well as cross-university events are organised that allow students to meet other representatives of the field of geomatics in Latvia. At the same time, it also helps students become aware of the skills acquired during their studies, seeing their strengths and weaknesses, which are then developed by students in the learning process. It is noted that sometimes such measures contribute to students' desire to explore the study matter more profoundly. For example, in the process of arranging the competition "Are You the Surveyor No.1?", RTU teams asked the lecturer to help them preparing for the competition, in addition to practicing the various disciplines of competition erudition and practicality, which resulted in the unbeatable victory of RTU teams over several years and the enhanced convergence of courses, which in turn contributed to a better understanding of their further study process by students and internship at companies. As far as possible, activities also attract industry companies that motivate students with different awards and opportunities to operate in their businesses in the future.

Students of the study programme are also involved in scientific work and research on topical issues in the sector, participating in both local and international conferences. Student Scientific and Technical Conferences are organised in the spring semester.

Students can also participate in the annual International Scientific Conference of RTU. Research results are summarised after each part of the conference and a collection of theses is published.

The Council of European Geodetic Surveyors (CLGE) has been hosting an annual student contest for eight years. For several years now, students of the Department of Geomatics have been taking part in this contest, demonstrating that they are competitive and having received CLGE awards in various nominations for three consecutive years. In 2019, it was reported that Latvian students were the most active among all European Member States and most thesis were submitted exactly from Latvia, half of which were from RTU students. In 2020, the European GNSS Agency (GSA) also became co-authors of this contest. The cooperation has lasted for several years and, as the GSA's role in the contest has increased, GSA and CLGE have become partners, sharing the idea of organising this contest jointly in the future. Hence, the format has also changed for the student contest, and two directions of the contest have been created – "CLGE Students' Contest on the Move" and "Geomatics on the Move Prize 2020". With the change of the format, the participation requirements have also increased, but it has not prevented representatives of the Department of Geomatics from participating and also this time one student has been nominated for the finals.

Every year, there is a student contest of the State Land Service and the Latvian Association of Surveyors organised, for which Bachelor Papers of young graduates are nominated. Students of the Department of Geomatics are also nominated for this contest, having received recognition for effective, innovative and industry-relevant research, described and addressed in the framework of Bachelor Papers.

Student-centred education provides for active participation of students in the study process, using a variety of teaching methods (discussion, practical tasks), which in turn promote equality between students and academic staff. This process is implemented by academic staff in their study courses, such as Assoc. Prof. M. Kaļinka and lecturer U. Krutova in their study courses related to geodesic measurements, calculations, software and cartography, geographic information systems organise seminars, where each student presents their theme, acting as a lecturer. Other members of the academic staff actively use group work at their practical classes, facilitating understanding of teamwork and common responsibility for the results of their work.

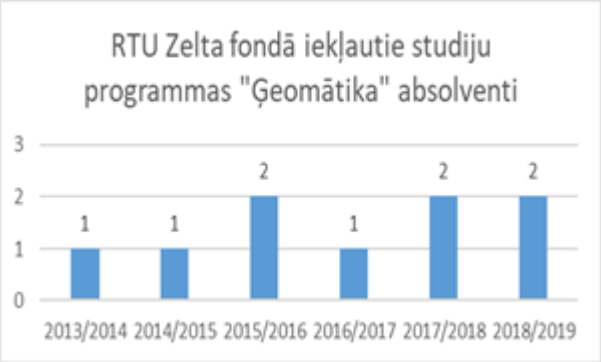
The results of the assessment of students' knowledge are discussed twice during the course of studies at the meetings of the Department of Geomatics, they are summarised, evaluated by the programme administration and serve as a basis for further development of the learning process. The results are also discussed at the meetings of the Council of the Faculty of Civil Engineering.

The learning outcomes of the students tend to be different. Full-time students have a very wide range of average grades for their first year of study. This is due to the different levels of previous knowledge among students.

Analysing the issue, it must be concluded that, compared to previous years, the learning outcomes have increased and attitudes of students to learning have improved. Certainly, it is also the result of changes in the working style of academic staff, as well as the use of innovative approaches included in courses of study programmes, by organising the study process in a cooperative manner, in cooperation with the industry leading professionals and students of the study programme.

It must be concluded that, compared to previous years, awareness of students and attitudes towards learning more effectively through the use of newer innovative dual approaches to study courses have increased. The first year is based on general education and field-specific study courses. In the next years of study, the situation regarding the learning outcomes continues to improve in terms of success, which is also reflected in the following indicators.

RTU has the Alumni Golden Fund that includes the most prominent and capable RTU graduates, assessing them both by academic achievements and by public activities. Since 2013/2014 academic year, students of the study programme have also been included in the Golden Fund.



During the last six years, nine graduates of the study programme were included in the Golden Fund.

In 2013/2014 academic year, one graduate was included in the Golden Fund and in 2014/2015 academic year, another graduate. In 2015/2016 academic year, already two graduates were included in the Golden Fund.

In 2016/2017 academic year, one graduate of the programme was included in the Golden Fund. In 2017/2018 academic year, again two graduates were included in the Golden Fund. In the 2018/2019 academic year, two more graduates of the programme were included in the Golden Fund.

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

Industry internship is an integral part of the **Professional Bachelor Study Programme "Geomatics"**, which is to be done according to LR regulations, the resolution of RTU Senate No 467 of 29 April, 2002 "On the structure of the second-level professional study programmes" and the resolution of RTU Senate No 626 of 28 January, 2019 "On organization of internship at Riga Technical University, new edition".

Internship takes place in accordance with the Regulation, in which general provisions are developed by RTU Senate. The Regulation of RTU Senate is published on the University website and in the ORTUS system.

The Senate decision on the Internship Organisation Procedure, updated in 2019, prescribes that in providing a place of internship, students are assisted by an internship coordinator of the respective organisational unit. If additional assistance is needed, it is possible to apply to the Career Support and Services Department, where a career adviser and a project manager help students with searching for internship places and, through a variety of measures, develop career management skills that can deliver successful results in the internship process.

Once a year, the Career Support and Services Department organises RTU Career Day, within the framework of which students can meet representatives of companies and communicate on their future work and internship opportunities.

An additional resource, which has been developed since 2015, is the webpage, where companies are invited to place their vacancies, which are topical for RTU students (https://ekarjera.rtu.lv/). By using the University password, students can connect and follow available internship places and later also job opportunities.

Additional support in promoting practical skills is RTU Development Fund (https://www.rtu.lv/lv/attistibasfonds). During a year, several hundred practical skills promotion contests are offered, organised in cooperation with businesses, where students have the opportunity to acquire practical skills.

Internship is implemented in accordance with the internship agreement concluded by RTU with the employer on the provision of a place of internship and the student. The internship agreement includes the aim and tasks of the internship, its planning, the procedure for evaluating the internship achievements, as well as duties and responsibilities of the parties. When determining the aims and tasks of the internship, it also includes familiarising of the student with the organisational structure and operational principles of the relevant internship place. Representatives of organisations or undertakings with which the internship agreement is concluded participate in determining the aims and tasks of internship, as well as evaluate it. There are internship commissions set to examine the performed work according to the provisions of the internship agreement.

As a result, a close cooperation is established with enterprises, organisations, state and municipal institutions, where graduates of RTU Department of Geomatics of the Faculty of Civil Engineering work, who help ensure internship places for students.

Department of Geomatics helps students find a place to practice, it is especially worth noting that among places of internship we have the honour to name the State Land Service, the Latvian Geospatial Information Agency, Ltd. Metrum, Ltd. Merko and many other enterprises. There is another internship planned within the study programme. The internship volume is as follows: Part D Internship 26 CP – Specialising internship (at an enterprise). Student internship places are ensured in organisations which are members of the professional associations, private firms, state and

municipal institutions.

The main aim of internship is to ensure and promote combining of students' theoretical knowledge with practical work, in order to evaluate opportunities to use the knowledge obtained at the university in practice, as well as consolidation and development of professional skills. During the internship, familiarisation with real or industrial aspects of geodesy, cartography and land survey takes place.

During the internship, students develop their internship reports in compliance with the internship programme requirements, as well as complete a comprehensive internship report/description in accordance with the detailed tasks. The internship report is written during the internship. It is to be submitted to the superviser of internship at the final stage of the internship and to be publicly presented at the internship assessment commission established by the Department of Geomatics within the term indicated in the semester schedule. To provide a wider publicity and to make the schedule clear for all, this information is also published on the webpage of the Department of Geomatics (geomatika.rtu.lv) for the convenience of the academic staff and students.

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

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

Professional Bachelor Study Programme "Geomatics"

Upon completion of the professional Bachelor study programme, the graduate should be able to carry out professional, innovative and research activities by using theoretical knowledge and skills, and to formulate and describe information, problems and solutions analytically.

In the Bachelor Paper, a student analyses, evaluates, conducts research, offers solutions, develops a practical solution or project, etc.

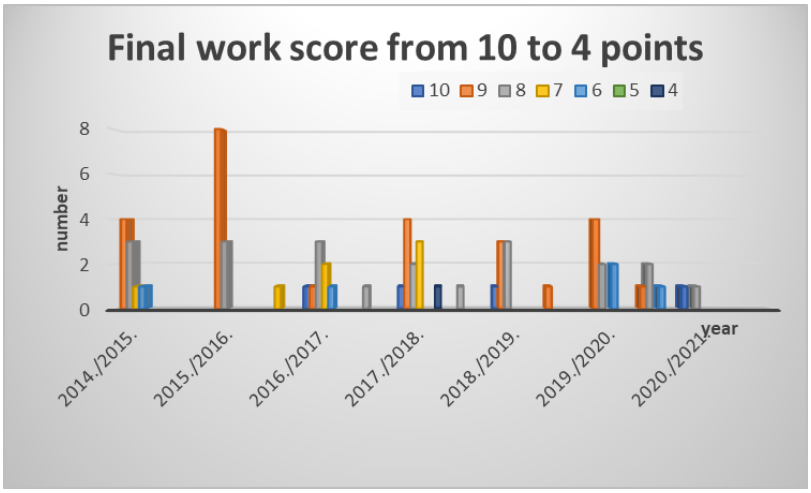
At the end of the programme, students should develop their Bachelor Paper dedicated to topical challenges in the field of geodesy, cartography or land management, related to the acquisition, processing, analysis of the geospatial data or innovative solutions in the field of specialisation.

The Bachelor Paper is presented publicly in front of the State Examination Commission. The Commission operates in accordance with the university regulation approved by the Senate; it includes, complying with the requirements, the industry representatives. The State Examination Commission includes industry representatives with high professional qualification and experience.

Themes of the Bachelor Paper comply with the latest tendencies in geodesy, cartography and land management. The State Examination Commission includes industry representatives with high professional qualification and practical work experience. The study programme, in the process of its implementation, is supplemented and updated, based on common research and consultations with employers and professionals in the field. Recommendations of graduates, students and the

academic staff are significant in the study process improvement. Changes are focused mostly on changing the learning style with “learning to learn” and information technology integration, programming, own-initiative solutions. The study process is organised in such a way that the themes of study and research papers include essential issues of the geospatial field.

Students acquire research skills by working regularly with references and Internet resources to successfully develop different study papers, internship reports and Bachelor Paper. This promotes research by students, working with international scientific databases, international standards (ISO) available at the RTU library with an electronic approach from the ORTUS environment, as well as the information sources and materials needed for the Bachelor Paper are already collected in the course of studies undertaking internship at an enterprise.



Upon public presentation of each Bachelor Paper, the State Examination Commission provides a report on the quality of the developed Bachelor Paper, its topicality and the average assessment of the student. During public presentation of the Bachelor Paper, the Minutes are taken, where the main questions and the obtained assessment are reflected.

The themes of the students’ graduation papers are topical, comply with the programme aims, ensure the learning outcomes and are in conformity with the needs of the field of geomatics, geodesy, cartography and land management, innovations and science tendencies.

For example, in 2019 and 2020, the following themes of the Bachelor Paper were chosen:

1. BIM Solutions in Geomatics;
2. Data in the Marine Cadastre Model;
3. Use of Unmanned Aerial Vehicles in Construction Processes;
4. Use of Laser Scanning Data in Bridge Analysis;
5. Land Use Change and Land Consolidation Solutions for the Construction of the Rail Baltica Route;
6. 3D Modelling Principles in the Graphic Environment;
7. Areas Affected by Industrial Accident Risks and their Identification;
8. Modelling of Surfaces with Geotechnical Parameters for the Machine Control System;
9. Checking the Compatibility of Latvian Quasi-Geoid Model LV’14 with the Local Geodetic Network of Riga City;
10. Spatial Survey of Geological Objects;
11. GIS Solutions to Promote Municipal Waste Reduction;
12. Structure 3D Modelling Applications for BIM;
13. 3D Model of Engineering Communications for BIM Processes;
14. Identification and Actual Location of Engineering Networks;

15. Automatic and Semi-Automatic Image of Objects from the Laser Scanning Point Cloud;
16. Use of Orthophoto and Dot Cloud Obtained by Unmanned Aerial Vehicles for Construction Control Purposes;
17. Control of Useful Mineral Resources by Unmanned Aircraft;
18. Determining Construction Elements with Unmanned Aerial Vehicles;
19. Engineering Network Matching Model;
20. Development of the Local Geodetic Network in Agenskalns and Tornakalns, Riga;
21. Analytical Inversion of the Soil Mark Types for the Combined Network.

In 2016, the State Land Service announced the competition “Best Graduation Papers of Higher Education Institutions”, where the award in the category “The Best Bachelor Paper” was granted to the graduation paper “Maintaining the Border Characters of Real Estate” by the graduate of Riga Technical University for the profound historical and foreign experience, analysis of regulatory enactments and the current situation, supplemented with own vision and opinion. The graduation paper “Effectiveness of Geodetic Control Methods in Building Structures” of Riga Technical University also won the award “The Best Bachelor Paper” for an expanded report on measuring methods to be used in the construction process to ensure control, as well as detailed survey requirements and measuring tools for various design elements to be used for monitoring and control.

In 2015, the award in the category “The Best Bachelor Paper” was granted to the Bachelor Paper “Development of the Marine Cadastre in Europe and Latvia” of Riga Technical University for the personal contribution to the theme, the reasoning included and the conclusions reached regarding the marine cadastre in Europe and Latvia.

In 2014, the award in the category “The Best Bachelor Paper” was granted to the Bachelor Paper “CAD Data Transformation Algorithms on GIS” of Riga Technical University for the significance and relevance of the theme, the profound research on the theme and the developed tools for further integration of CAD and GIS systems.

Analysing the data, it is clear that the aforementioned themes of graduation papers are closely related to the topical issues of geomatics industry (geodesy, cartography and land management).

3.3. Resources and Provision of the Study Programme

3.3.1. Assessment of the compliance of the resources and provision (study provision, scientific support (if applicable), informative provision (including libraries), material and technical provision, and financial provision) with the conditions for the implementation of the study programme and the learning outcomes to be achieved by providing the respective examples.

The study process is fully provided with latest educational materials, which students receive from RTU Central Library or the textbook subscription and can use during the entire period of studies. RTU students and academic staff have a wide and modern RTU Scientific Library available (in Ķīpsala, at Paula Valdena Street 5), where it is possible to use all kinds of educational materials, electronic subscription databases and temporary test databases. Working hours of the Library reading room for RTU students is 24/7, as the reading room of RTU Scientific Library is the place,

where students can learn also late at night, beyond the working hours of the Library or the faculties. To intensify the study process, students are provided a continuous access to the RTU unified study support system “ORTUS”. Currently, ORTUS provides students with:

- uploading of lecture materials and presentations;
- automatic uploading of video recordings of the lectures;
- regulatory enactments for study processes and amendments thereto;
- remote authorisation of students for commercial electronic information means (databases);
- electronic processing of tests and home assignments;
- information on learning outcomes of a student; information on a student’s financial position, with an opportunity to prepare invoices in electronic form;
- online registration/cancellation of registration for the next semester courses.

In order to supplement the amount of information sources and to restore the content of the expenditure available in the Library, the study programme administration has purchased new textbooks. The table below summarises the number of textbooks purchased and the amount of money spent.

Year	Programme	EUR	Number of copies
2019	Geomatics	214,75	5
2018	Geomatics	689.18	5
2017	Geomatics	808.12	11
2016	Geomatics	636.65	11
2015	Geomatics	665.97	8
2014	Geomatics	632.10	7

In order to ensure the qualitative study process, FCE is carrying out extensive refurbishment works, upon their completion the Faculty will meet international standards for campuses and lecture halls. Numerous new laboratories will be opened, which will promote development of the practical component of the study courses and introduction of technologies in the study process. The equipment in the existing premises is also continuously updated. Classification of the premises is given in the table below.

Room type	Number of rooms	Useful area m^2
Meeting room	1	70.91
Computer rooms	4	243.77
Auditoriums	23	1702.34

Teachers' rooms, cabinets	69	1523.61
Assistant professor / Doctoral student premises	5	196.24
Workspace / workshop	6	172.19
Research facilities	6	350.53
Laboratories	35	1256.83
Resource room	6	213.53
Auxiliary room	11	197.99
Anteroom	3	35.89
Student self-government and record keeping	3	260.43
Kitchen	1	16.43
Total		**6240.69**

The Department of Geomatics, which implements the study programmes being part of the Faculty of Civil Engineering, has set up its own geodetic survey tool laboratory, in which students have the possibility to use geodetic laboratory equipment and relevant special computer programs for various study courses, such as “Geodesy”, “Practical Geodesy”, “Advanced Geodesy”, “Geodetic Measurement Processing”, “Global Positioning Systems” or other study courses. The following can be mentioned as examples:

1) precise tachymeters for surveying geodetic networks, with special software;

- leveling instruments for building high-altitude networks with data processing computer programs;
- Laser scanners for indoor and outdoor premises, with special programming equipment for the acquisition, processing and modelling of 3D data;
- cable locator;
- quartz spring gravimeter GNU-KV;
- professional drone – FlyTop, unmanned aerial vehicle FLYNOVEX with a control unit, six accumulators, battery charging equipment, high-definition camera and thermal camera FLIR VUE PRO, used by the Department of Geomatics in collaboration with the Institute of Civil Engineering and Real Estate Economics (ICEREE);

- Mavic 2 Enterprise Dual drone with smart controller equipped with high-performance cameras and thermal cameras, including programming for measured data processing;
- several GNSS receivers, including the latest and the most modern receiver and controller Leica Viva GS12 + CS15, which receives signals of GPS + GLONASS + GALILEO satellite systems.

Students can use the services provided by RTU Library (https://www.rtu.lv/en/studies/scientific-library). They also have resource rooms at their disposal, where they can familiarise themselves with latest periodicals, statistical materials, books, conference materials on the topical issues in the field.

The Department also has a free-access special literature library, where a student can take a book of interest and return it afterwards.

The Scientific Library of RTU (https://www.rtu.lv/en/studies/scientific-library) is an academic library of state significance, which has obtained its status as a result of library accreditation. The Scientific Library of RTU provides the necessary information for RTU study process and research activities, performs library, bibliographic and information services for RTU students, teaching staff, and employees. The Library's collection includes 1.4 million printed documents and e-resources in the databases relevant to RTU fields.

In 2016, significant investment was made in the development of the library infrastructure, with the construction of an additional 2240 m2 of space for the Central Library. The total area of the library premises is 6393 m2, of which 3417 m2 are for reader services. There are 713 workstations for library users. The library has four group rooms and six individual cubicles, a Western reading room and a conference room. The library is accessible to users with reduced mobility.

To improve the work of the Scientific Library of RTU and to ensure the availability of information needed for study and research work, the Library Council has been established, which decides on the replenishment of the library's collection with printed publications and subscriptions to the necessary databases. The Library Council has approved the "*RTU SL Collection Completion Policy*", which defines the basic principles of collection formation and development in accordance with the directions of RTU study and scientific activities.

When RTU provides funding for the library, the funding for information resources for each study programme is calculated. The collection is replenished according to the recommendations of the heads of study programme, researchers, and the allocated funding. The desired titles can be ordered by contacting the Library's Collection Development Department, ordering on the Library's website, filling in the order form, filling in the application form, by phone or by visiting the Library. The Scientific Library offers a guide to ordering titles and e-resources, which brings together the websites of various publishers and bookshops in Latvia and abroad.

The following publications have been acquired to ensure the library resources of the study programme:

Auziņš, Armands. Zemes izmantošanas novērtēšana un pārvaldība: zinātniska monogrāfija. Riga: RTU Publishing House, 2016. 270 p;

Bērziņa, M. u.c. Kadastrs: no viduslaiku nodevu saraksta līdz modernai informācijas sistēmai un daudzfunkcionālam kadastram. Riga: VZD, 2013. 311 p;

Stūrmanis, E. Ģeoinformācijas sistēmas. Jelgava: LLU, 2006. 90 p;

Heywood, I., Cornelius, S., Carver S. An Introduction to Geographical Information Systems. New York: Wesley Logman, 1998. p 279.;

Štrauhmanis, J. Tematiskā kartogrāfija. Riga: RTU, 2002. 64.;

Štrauhmanis, J. Kartogrāfija tūrismā. Riga: Turība, 2004. 80 p;

Štrauhmanis, J. Kartogrāfija. Riga: RTU, 2004. 118 p.;

Šrauhmanis J. Kartogrāfija. Riga: Zvaigzne, 1993. 52 p.;

B.Helfriča, U.Zuments. Ģeodēzija. Riga: LĢIA, 2007. 262 lpp.;

2003. Vanags. Mūsdienu Latvijas topogrāfiskās kartes: Fotogrammetrija. Riga: VZD, 2003.;

Mūsdienu Latvijas topogrāfiskās kartes. Riga: VZD, 2001.;

Auziņš, A. Zemes pārvaldības pamati. Riga: RTU Publishing House, 2008.;

Žagars, J,. Zvirgzds, J., Kaminskis, J. Globālā navigācijas satelītu sistēmas / GNSS. 2014. 232 p.;

Rikitake, T., Honkura, Y. Solid Earth Geomagnetism (Developments in Earth and Planetary Sciences, 5). New York: Springer, 1985. 385 pp.;

Jankowski, J., Sucksdorf, C. Guide for Magnetic Measurements and Observatory Practice. Warsaw: IAGA, 1996. 238 pp.;

Mandea, M., Korte, M. Geometric Observations and Models. New York: Springer, 2011. 344 pp.;

Newitt, L., R, Barton, C., E., Bitterly, J. Guide for Magnetic Repeat Station Surveys. Warsaw: IAGA, 1996. 129 pp.;

Ģeomātikas pamati: mācību līdzeklis. Riga: RTU, 2006. 66 p.;

1993. Freijs, O. Jakubovskis, M. Kronbergs, U. Zuments. Ģeodēzija. Riga: Zvaigzne, 1993. 383 p.;

1994. Biķis, V. Freijs, M. Kronbergs, R. Krūpens, O. Jakubovskis. Ģeodēzija: mācību līdzeklis LPSR augstskolu studentiem ģeodēzijas kursa apguvei. Riga: Zvaigzne, 1974. 407 p.;

Helfriča, B. Mērniecība: mācību līdzeklis. Jelgava: Latvijas Lauksaimniecības universitāte, 2007.;

Helfriča, B. Mērniecība: mācību līdzeklis. Jelgava: LLU, 2004.;

Balodis, J. Mērniecība. Riga: Autora izdevums, 1934.;

2001. Boruks, V. Eihmane, G. Kalniņš, O. Nikodemus, V. Paršova, P. Zālītis. Zemes izmantošana un kadastrs Latvijā. Riga: LLU Skrīveru zinātnes centrs, VZD, 2001. 405 p.;

Rīgas Tehniskās universitātes zinātniskie raksti. 11. sērija, Ģeomātika. Riga: RTU, 2007.;

Ģeomātika: zinātnisko rakstu krājums. Riga: RTU, 2005.;

2003. Kondruse. Darbs ar karti un plānu: praktiskie darbi ģeodēzijā. Riga: RTU, 2003.;

Apse, I. UTM koordinātu sistēmas (NATO standarts) Eiropas un krievu miljēmu topogrāfiskā leņķa [alfa] T, attāluma DT skaitļošanas tabulas. Riga: Imants Apse, 2001. 73 p.;

Howard, K., Mcmaster, S. Thematic cartography and geovisualization. 3rd edition. Harlow: Pearson, 2014. 618 lpp.;

Dent, Borden D. Cartograph: thematic map design. 6th edition. New York: McGraw-Hill Higher Education, 2009. 336 p.;

DeMers, Michael N. GIS modeling in raster. New York: J. Wiley, 2002. 203 p.;

Yan, Haowen. Surveying: principles and methods. Oxford: Alpha Science International, 2012. 318 lpp.;

Sands, Russell. Handbook of geodetic science. New York: Callisto Reference, 2015. 342 p.;

Bolbol, Saad. Hand book of geodetic astronomy: theory and practice. Saarbrücken: Lambert, 2011. 157 p.;

Phillips, Lee. Gnuplot cookbook: over 80 recipes to visually explore the full range of features of the world's preeminent open source graphing system. Birmingham: Packt Publishing, 2012. 205 p.;

Jensen, John R. Remote sensing of the environment: an earth resource perspective. 2nd edition. Harlow: Pearson, 2014. 614 p.;

Meyer, Thomas Henry. Introduction to geometrical and physical geodesy: foundations of geomatics. Redlands: ESRI Press, 2010. 246 p.;

Advances in remote sensing for natural resource monitoring. Hoboken: Wiley-Blackwell, 2021. 480 p.;

Ghilani, Charles D. Elementary surveying: an introduction to geomatics. 14th edition, global edition. Harlow: Pearson, 2016. 958 p.;

Paul A. Longley et al. Geographic information systems and science. 3rd edition. Hoboken: Wiley, 2010. 539 lpp.;

Paul A. Longley et al. Geographic information systems and science. 4th edition. Hoboken: Wiley, 2015. 477 lpp.;

Nisbet, Gloria. Introduction to Geodesy. New York: Larsen & Keller, 2018. 231 p.;

Van Sickle, Jan. GPS for Land Surveyors. Fourth edition. Boca Raton: CRC Press, Taylor & Francis Group, 2015. 349 p.;

Seeber, Günter. Satellite geodesy / Günter Seeber. Berlin, New York: de Gruyter, 2003. 589 p.;

Applications of 3D measurement from images. Dunbeath: Whittles Publishing, Boca Raton, FL: CRC Press, 2007. 304 p;

Luhmann, T. Close-range photogrammetry and 3d imaging. 3rd edition. Berlin, Boston: Walter de Gruyter, 2020. 822 p.;

Ogaja, Clement A. Geomatics engineering: a practical guide to project design. Boca Raton, London, New York: Taylor & Francis, 2011. 264 p.;

Topographic laser ranging and scanning: principles and processing. Boca Raton [etc.]: CRC Press/Taylor & Francis Group, 2009. 590 p.;

Stoter, Jantien. 3D cadastre in an international context: legal, organizational, and technological aspects. Boca Raton [etc.]: Taylor & Francis, 2006. 323 p.;

Leick, Alfred. GPS satellite surveying. 3rd ed. Hoboken: John Wiley, 2004. 435 p.;

Hildebrandt, Hubertus. Grundstückswertermittlung: aus der Praxis - für die Praxis. Stuttgart: Wittwer, 2001. 229 p.;

Gomarasca, Mario A. Basics of geomatics / Mario A. Gomarasca. Dordrecht: Springer, 2009. 656 p. ;

Torge, W., Wolfgang, J. Geodesy. 4th ed. Berlin, Boston: De Gruyter, 2012. 433 p.;

Precise geodetic infrastructure: national requirements for a shared resource. Washington: National Academies Press, 2010. 142 p.;

Long, L. T. Acquisition and analysis of terrestrial gravity data. Cambridge: Cambridge University

Press, 2013. 171. p;

Grafarend, Erik W. Optimization and design of geodetic networks. Berlin: Springer, 2012. 606 p.;

Усова, Н. В. Геодезия : (для реставраторов). Москва: Архитектура-С, 2006. 220 p.;

Шабалина, Л. А. Геодезия: учебное пособие для вузов, техникумов и колледжей железнодорожного транспорта. Москва: УМК МПС России, 2002;

Большаков, В. Ю. Геодезия. Изыскания и проектирование инженерных сооружений: справочное пособие. Москва: Недра, 1991. 237 p.;

Н. Н. Воронков и др. Геодезия. Геодезические и фотограмметрические приборы: справочное пособие. Москва: Недра, 1991. 428 p.;

Ю. К. Неумывакин, Е. И. Халугин, П. Н. Кузнецов, А. В. Бойко. Геодезия. Топографические съемки: Справ. Пособие. Москва: Недра, 1991. 315 p.

Database subscription contracts are concluded both directly with the supplier and through the "Cultural Information Systems Centre" state agency, which is the Latvian national representative of the international non-profit organisation EIFL (Electronic Information for Libraries, http://www.eifl.net/). The EIFL Licensing Programme offers national libraries subscriptions to internationally recognised databases at significantly reduced subscription fees not offered to individual subscribers, thus saving financial resources of the libraries.

The database subscriptions maintained by RTU Scientific Library

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

- 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.
- Databases financed by the Ministry of Education and Science available to RTU Scientific Library: ScienceDirect, SCOPUS (Elsevier), Web of Science.
- Latvian databases: LETA, Letonika, the Database of Latvian Standards (available on the premises of the Library).

Database usage at the Scientific Library of RTU has been growing since 2016. E-resource loans have increased from 75,391 to 525,194 items.

The new library premises have allowed to extend the range of services. Since the opening of the new premises in 2018, the number of visits to the library has increased from 103,825 to 235,600. The Scientific Library of RTU is open to everyone. The Central Library is open to users from Monday to Saturday. There is a 24/7 reading room. During the summer period, the Central Library is open every weekday with reduced opening hours. (Scientific Library | Riga Technical University (rtu.lv))

The library sources are housed in an open-access collection. Books and periodicals according to the field of study and the UDC indexes are located in the central building of the Scientific Library, 5 Paula Valdena Street, Riga. The last copies of the oldest publications corresponding to the RTU profile are kept in the library repository. They are always available to the users.

The librarian on duty helps visitors find their way around the collection. Bibliographers (information specialists) provide more detailed information and advice. The library has a branch librarian service. (https://www.rtu.lv/lv/studijas/biblioteka/nozaru-informacija) in Latvian).

The library resource search is supported by the Primo Discovery search tool

((https://www.rtu.lv/lv/studijas/biblioteka/vienota-informacijas-meklesana)in Latvian). It allows searching the library catalogue (RTU SL Catalog (UK) - Basic Search (kopkatalogs.lv)), the subscribed databases, as well as databases created by the RTU Scientific Library ((https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/bibliotekas-veidotas-datubazes)in Latvian) in one interface. Searching for information in the electronic joint catalogue (https://kopkatalogs.lv/F), it is possible to simultaneously obtain information on the resources available in 12 Latvian libraries. Both the electronic catalogue and the RTU portal ORTUS allow remote reservation of library resources, as well as remote access to the databases. Since the introduction of RFID technology, users can use five self-service book-dispensing machines and check out books from the pick-up machines around the clock.

The library provides students, academic personnel and other stakeholders with various levels of individual consultations and group training in information literacy ((https://www.rtu.lv/lv/studijas/biblioteka/lietotaju-apmacibas)in Latvian).

Publications not available in the library are delivered via an interlibrary loan or an international loan.

Internet access is available throughout the library. The library has copying, scanning, printing, binding services and a self-service dining room.

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

Not applicable.

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

RTU funding from the state main budget consists of the base financing corresponding to a list of study programmes and the number of students, consisting of funds for utility payments, taxes, infrastructure maintenance (including the provision of data to the Register of Students and Graduates), the purchase of tools and equipment and personnel salaries, as well as financing for scientific activities.

The number of study seats is allocated upon discussions with the Ministry of Education and Science. The study base funding from the resources of the state budget is allocated to full-time studies. The amount of the study base funding is determined on the basis of the number of study seats specified by the state at RTU, as well as the base costs of the study seat determined by the state and the cost ratios of studies in thematic areas of education.

RTU funding from the state main budget for the provision of study seats for the relevant study year is allocated in accordance with the procedures specified in the RTU Senate decision “On the Methodology for Allocating and Spending the Main Budget, Performance Funding and Tuition Fees at RTU Organisational Units” for the respective academic year. This methodology is reviewed annually and approved in a new version, taking into account the necessary changes.

RTU has a decentralised budget and a separate budget is planned for each organisational unit. The budget is, in general, a revenue and expenditure plan for a specified period, work, measure or function. Revenues and expenses of RTU are managed on the basis of principles approved by the Senate or by the powers conferred on it by the Vice-Rector for Finance.

According to the Methodology, funding for organisational units is allocated either according to the financial or budget year, or immediately after receipt of funding. For RTU organisational units, a financial or budget year ranges from October to September of the following year, the following is calculated and allocated for this time period:

- subsidy or main budget funding (educating students for the state budget means) is allocated as a monthly limit – 1/12 of the calculated annual funding is allocated to an organisational unit per month;
- tuition fee funding (educating the tuition fee paying students, including debtors' fees) is allocated twice a year (October and April) as a monthly limit – 1/6 of the calculated semester funding is allocated to an organisational unit per month;
- performance funding (research support funding) is allocated as a monthly limit – 1/12 of the calculated annual funding is allocated to an organisational unit per month;
- research base funding (research support funding) is allocated as a monthly limit – 1/12 of the calculated annual funding is allocated to an organisational unit per month.

Analysing the procedure of funding of study programmes at RTU in general, it is seen that the main budget and tuition fee funding from local students is determined in the long term on the basis of the fundamental principles established by the state. In the process of setting the volume of funding, the cost ratios of studies in thematic areas and the values of study costs according to the level of the study programme, as well as the number of students in the study courses are taken into account.

As mentioned above, it is possible, through the cost ratios of studies in the thematic areas of education, to determine the amount of funding needed to carry out the specific study programme and study course. The RTU Senate has confirmed that, in future, the cost ratios for studies in the thematic areas of education will be applied individually to each study course of the study programme, thereby providing an even more appropriate amount of funding for the implementation of study courses of the study programmes. In order to implement this system by the order of the Vice-Rector for Academic Affairs, an Expert Commission was established which identified a thematic area for each study course. The actual costs of the study programme “Geomatics” are as follows:

Study year	Grant prog. EUR	Tuition fees for local students. EUR	Tuition fees for foreign students. EUR	Total funding apps. EUR	One state budget place financing. EUR
2014/2015	128478,7	25534,27	0	154013,00	3866,02
2015/2016	150141,8	18378,28	0	168520,04	3866,02

2016/2017	123831,3	18412,87	3789,65	146033,86	3866,02
2017/2018	129338,4	17319,93	3248,70	149907,02	4040,66
2018/2019	134758,4	19557,75	3349,43	157665,58	4229,68
2019/2020	110263,4	8980,00	3671,98	122915,33	4405,04

2020/2021 grants prog. 149209,5EUR, Costs per 1 student 4462,81 EUR.

Financial resources of the study programme “Geomatics” are sufficient for the study programme implementation and their usage is controlled regularly both on the part of the administration, and on the part of RTU Vice-Rector for Finance.

The actual costs of the study programme for 6 years are provided in point 3.1 of the report, for example, in the academic year 2019/2020 the costs of the programme are EUR 122915.

The available funding after payment of remuneration is used for the development of the study programme for the purchase of still geodetic instruments, equipment, software, hardware, supplementing the latest range of textbooks from the implementation of the department's projects or their general deductions and other savings.

Information on the minimum number of students in RTU study programmes is provided in the appendix of the self-evaluation report "On minimal number of students in study programmes".

Information on the funding distribution between the cost items is provided in the appendix of the self-assessment report "Funding distribution between the cost items".

The specific development of each study programme is the responsibility of each study programme director, as well as the faculty responsible. For the development of all study programmes, central funding is used for the renewal of the research library, improvement and maintenance of shared classrooms, public relations, programme marketing activities, development and maintenance of information systems related to the study process, development of the Ķīpsala complex and other activities.

Tuition fees are set in line with the National Audit Office's warning that tuition fees for students studying with budget students cannot be less than the public funding for this service. Part-time extramural studies do not receive State funding, so tuition fees are set taking into account a number of factors, such as the programme's ability to cover its costs, the market situation, demand for the programme, the stage of development of the programme, etc.

3.4. Teaching Staff

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

Qualifications of the academic staff involved in the implementation of the study programme conform to the terms and conditions for the implementation of the study programme and the requirements of regulatory enactments. The employees elected to the academic positions at RTU, guest lecturers and Doctoral students are involved in the implementation of the study programme.

The study programme also involves staff working on different research projects, so that the knowledge acquired in the projects can be transferred to the study programme, having improved the content of study courses.

Currently, four guest lecturers participate in the implementation of the study programme. These academic staff representatives work at other universities and enterprises and conduct certain study courses of the study programme in the form of exchange, thus ensuring mutual cooperation not only at RTU, but also with other universities. Training and qualification upgrade of academic staff take place through participation in conferences and seminars, attending different courses, participating in the operation of other organisations, working as experts and consultants. Every year, academic staff take active part in methodological seminars organised by RTU and other universities.

The following academic staff members are involved in the implementation of the study programme:

Jānis Kaminskis, Dr.sc.ing., RTU Assoc. Prof., obtained and developed his professional scientific and pedagogic qualifications and competence at different universities in Finland, Denmark, Switzerland and now implements them in his academic, methodological and scientific research activities. Scientific interests of J. Kaminskis are related to different areas – geodesy, astronomy, gravimetry, land survey, geospatial information, civil engineering, both locally and internationally. Jānis Kaminskis is an engineering industry expert of the Latvian Council of Science in the field of construction, including geodesy and geoinformatics. Assoc. Prof J. Kaminskis is the author and co-author of over 95 scientific publications, including three books. Currently, he leads a number of Nordplus projects, including the following (from 2014 to 2022): Access to Geodetic Education for Society, No. NPHE-2014/10461; Geodetic Education Partnership, No. NPHE-2018/10380; Geodetic Education Partnership, No. NPHE-2019/10364 and Geodetic Education Build-up, No. NPHE-2020/10401. In addition to his main work, he is a member of the Presidium of the Nordic Geodetic Commission, chairs the Latvian National Association of Geodesy and Geophysics, acts as an academic member of the International Federation of Surveyors. ORCID iD https://orcid.org/0000-0001-6345-8084. The qualification of Assoc. Prof. Jānis Kaminskis complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study courses “Fundamentals of Geomatics”, “Geodetical Gravimetry” and “Bachelor Paper”.

Armands Auziņš, Dr. oec., Associate Professor, has developed a number of training methodological materials, over 20 international scientific articles in the field of land management. A. Auziņš is a member of the European Academy of Land Use and Developmento. His scientific interests relate to land management, land planning and surveying, as well as territorial development planning. He upgrades his qualification regularly by attending seminars, conferences and professional qualification upgrade courses. Currently, he works within the project “A Values-Led Planning Approach for Sustainable Land Use and Development, Activity 1.1.1.2 “Post-doctoral Research Aid” of the specific aid objective 1.1.1 “To increase the research and innovative capacity of scientific institutions of Latvia and the ability to attract external financing, investing in human resources and infrastructure” of the operational programme “Growth and Employment” (No.

1.1.1.2/VIAA/1/16/161), 2017-2020.

The qualification of Assoc. Professor A. Auziņš complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study course "Fundamentals of Land Management".

Iveta Stāmure, Mg.oec., Researcher, Doctoral student. Her interests pertain to issues related to real estate management, the construction sector, valuation of buildings and structures, building materials. She also works as a Real Estate Consultant at the company "Cēres nami" and the Latvian Association of Window and Door Manufacturers. She conducts practical classes in the study courses "Law on Construction and Rules on Construction" and "Valuation of Building Structures". She is a co-author of the monographs "Financing Models for the Renovation of the Residential Fund in Latvia" and "Socio-Economic Aspects of the Interaction between Urban and Regional Development". She upgrades her qualification regularly by attending seminars, conferences and professional qualification upgrade courses.

The qualification of I. Stāmure complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study courses "Real Estate Valuation Systems", "Real Estate Cadastre" and "Real Estate Valuation (for engineers)".

Māris Kaļinka, Dr.sc.ing., Assoc. Professor. He takes part in international projects such as INTERREG CB project "Coast4us" (1 January 2018–31 December 2020), "Height Precision Gravitation Model for Latvia, Including Sea Territory" (1 March 2018–up to now) and "Digital Platform iDārzs – For Sustainable Development of the Gardening Sector" (1 September 2019–up to now). He participated in projects such as "Development and Advanced Prefabrication of Innovative, Multifunctional Building Envelope Elements for MOdular REtrofitting and CONNECTions" (1 January 2014–1 January 2018). He is a Reviewer of the following scientific journals: The Baltic Journal of Real Estate Economics, Construction Management and Survey Review. M. Kaļinka's scientific interest is related to urban planning, introduction of digitisation in construction and urban management, geodesy, databases, geographic information systems, laser scanning, photogrammetry and land planning. M. Kaļinka is the author and co-author of several scientific publications. He actively participates in various conferences, professional training courses, working groups, workshops, hackathons that increase his professional qualification. The qualification of Assoc. Prof. M. Kaļinka complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study courses "Geographical Information Systems", "Geodetical Measurement Processing", "Geodetical Measurement Processing (study project)".

Mārtiņš Reiniks, Mg.sc.ing., Assist. Prof., Doctoral student. His interests involve geodesy, geodetic networks, laser scanning, unmanned aerial vehicles, engineering geodesy, remote exploration, global navigation satellite systems, spatial planning and land planning. M. Reiniks also works as a Manager at the Certification Centre of the Latvian Association of Surveyors, which performs conformity assessment and certification of the competence of surveyors (land survey, land cadastral survey and geodesic works. He is also a member of the Latvian Association of Surveyors, a member of the Geospatial Information Coordination Council and a member of the Surveying Advisory Council. He improves his qualification by attending conferences, seminars, including participation in different working groups. The qualification of Assist. Prof. Mārtiņš Reiniks complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of

the study programme and the study courses “Geodetic Networks”, “Topographic Mapping of Urban Area”, “Global Positioning Systems (study project)” and “Practical Placement”.

Kārlis Bērziņš, Mg.phys., Assist. Prof. His interests involve astronomy in the broadest aspect, which is confirmed by his activities in the Latvian Astronomical Society, the maintenance of the Meteorite Museum and its Internet domain (http://www.meteoriti.lv/), as well as research at Ventspils International Radio Astronomy Centre. The qualification of Kārlis Bērziņš complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study course “Astronomy”.

Ļubova Šuļakova, Mg.sc.ing., Lecturer. Her activities and areas of interest are the performance, planning, processing and analysis of geodetic measurements, including work on gravimetry and magnetometry. The participation in various qualification upgrade courses, seminars and conferences ensure the necessary qualifications for teaching. The qualification of Ļ. Šuļakova complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study courses “Fundamentals of Geomatics” and “Geodetical Gravimetry”.

Ints Lukss, Mg. phys., Lecturer. His range of interests is various information systems, including a large proportion of those related to the field of geomatics. There is also interest in unmanned aircraft, laser scanning and data processing, monitoring of different types and objects, software. He upgrades his qualification by participating in different seminars and conferences. The qualification of Ints Lukss complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study courses “Engineering Geodesy”, “Geodetic Control of Transportation Structures” and “Basic Land Information Systems”.

Olita Metuma, Mg.sc.ing., Assist. Prof. Her interests are related to geodesy, land management, land planning, territorial planning and real estate cadastre. She is a member of the Surveying Advisory Council and a member of the Latvian Association of Surveyors. The qualification of O. Metuma complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study courses “Legislation in Geomatics”, “Land Law”, “Basic Territorial Planning”.

Jānis Kokins, Mg.sc.ing, Lecturer. His research interests include topographical survey, land cadastral survey, land survey, measurement processing, geodetic networks, global navigation satellite systems, engineering geodesy, and geodesy. He is a member of the Board of the Latvian Association of Surveyors. He upgrades his qualification and ensures that topics are linked to students’ interests, participates in different field-related qualification upgrade courses, seminars and conferences. The qualification of Jānis Kokins complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study courses “Practical Geodesy”, “Fundamentals of Geomatic Data Processing” and “Surveying Instruments”.

Lauris Goldbergs, Mg.sc.ing., Lecturer, Doctoral student. His research interests include photogrammetry, unmanned aerial vehicles, global ground observation systems, astronomy, remote exploration, software, geographic information systems. He is a member of the Latvian Association of Surveyors and the Latvian Astronomical Society. He ensures qualification for work with students by cooperating and obtaining experience with other universities and through regular

participation in conferences, seminars and professional qualification upgrade courses. The qualification of Lauris Goldbergs complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study courses “Photogrammetry”, “Computer Graphics in Geomatics”, “Basics of Geoinformation Systems”.

Rita Pētersone, Mg.biol., Lecturer. The sphere of interests of R. Pētersone is related to real estate valuation and land cadastral valuation. She upgrades her qualification by attending conferences, seminars and professional qualification upgrade courses. The qualification of R. Pētersone complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study courses “Real Estate Cadastre”, “Real Estate Valuation Systems” and “Real Estate Valuation (for engineers)”.

Una Krutova, Mg.sc.ing., Guest Lecturer, Doctoral student. Her range of interests is surveying, cartography, databases, geographic information systems and their integration in the field of geomatics, open data. She takes part in the international project INTERREG CB “Coast4us” (1 January 2018–31 December 2020). She actively works at several organisations – as a Chairperson of the Board of the Latvian Association of Surveyors, as a member of the Board of the Latvian Association of Cartographers and Geodesists and the Latvian Association of Open Technologies. She also works at the Geospatial Information Coordination Council and at the Surveyal Advisory Council of the State Land Service. She upgrades her qualification by attending seminars, work groups, conferences, hackathons and professional qualification upgrade courses. The qualification of Una Krutova complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study courses “Cartography” and “Cartography and Photogrammetry (study project)”.

Jānis Ancāns, Mg.sc.ing., Assist. Prof. The range of interests of J. Ancāns is geodesy, geodesic measurements, software, numerical models. He upgrades his qualification by attending seminars and conferences. The qualification of Jānis Ancāns complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study courses “Application Programs in Geomatics”, “Advanced Geodesy”, “Digital Relief Models”.

Jānis Klīve, Mg.sc.ing., Assist. Prof. The range of interests of Jānis Klīve includes geodesy, geodetic measurements and calculations, land management and real estate cadastre, global navigation satellite systems and geographic information systems. In addition to working at the Department, J. Klīve is a member of the Board of the Latvian Association of Surveyors and Vice-President of the European Association of Surveyors. He upgrades his qualification regularly by attending seminars, conferences and professional qualification upgrade courses, as well as by participating in work groups of different levels. The qualification of Assist. Prof. J. Klīve complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study courses “Geodesy”, “Practical Geodesy”, “Cadastral Surveying”.

Jānis Zvirgzds, Dr.sc.ing., Assoc. Prof. Research interests of J. Zvirgzds are geodesy, geodetic measurements and calculations, geodetic networks, global navigation satellite systems. He upgrades his qualification by participating in different conferences, seminars and also GPS work groups of the European and national level. The qualification of Assoc. Prof. J. Zvirgzds complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of

the study programme and the study course “Global Positioning Systems”.

The qualification of Ilze Rozentāle complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study course “Roads (introductory course)”.

Līga Gaile, Dr.sc.ing., Assoc. Prof. L. Gaile is a co-author of the patent “Mixture of Indoor Plaster with Thermal Controlling and Heat Isolating Properties and Application Method”. She is a co-author of many scientific publications. She participated in the projects “A New Concept for Sustainable and Low-Energy Building Construction”, etc. L. Gaile upgrades her qualification by participating regularly in seminars, conferences and professional qualification upgrade courses. The qualification of Līga Gaile complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study course “Introduction to Structural Analysis”.

The qualification of J. Mačānis complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study course “Computer Science (basic course)”.

The qualification of Gerda Gaidukova complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study course “Principles of Environmental Engineering”.

Gunārs Ozolzīle, Dr.sc.soc., Assoc. Professor. Professional experience: he has been teaching social sciences (sociology, politology and Latvian political system) at RTU and other Latvian universities (University of Latvia, Latvian Academy of Sport Education, Police Academy of Latvia, College of Business Administration and Higher School of Social Technologies) since 1989; Chairman of the State Examination Commission of the Bachelor and Master study programmes “Sociology of Organisations and Public Administration at the Faculty of Economics and Social Development of Latvia University of Life Sciences and Technologies” (since 2005). He was a Researcher in market and public opinion at Ltd. Baltijas studiju centrs (1991-2018). He ensures the research link with students also by scientific research activities at the Latvian Council of Science, Ministry of Defence of the Republic of Latvia, participation in the EU financed projects, conferences, as well as development of scientific publications. His research activities have mainly been related to research into the stability and efficiency of the Latvian political system, as well as the possibilities for reforming individual political institutes. This research framework contributes to increasing the quality of conducting study courses and ensuring links with national political processes. His regular methodological work – development of teaching tools and other methodological materials also helps increase the study work efficiency. The qualification of G. Ozolzīle complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study courses “Politology” “Business Etiquette” and “General Sociology”.

The qualification of Aleksejs Šņitņikovs complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study course “Sociology of Management”.

The qualification of Diāna Rūpniece complies with the terms and conditions for the study

programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study course “English Language”.

The qualification of Larisa Rozenberga complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study course “German Language”.

The qualification of Ata Zariņa complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study course “Introduction to Civil Engineering and Building”.

The qualification of Elīna Gaile-Sarkane complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study course “Innovative Product Development and Entrepreneurship”.

The qualification of Modris Dobelis complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study course “Descriptive Geometry and Engineering Graphics”.

The qualification of V. Jemeljanovs complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study course “Civil Defense”.

The qualification of J. Bartušauskis complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study course “Basics of Labour Protection”.

The qualification of Igors Klemenoks complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study course “Physics”.

Daina Ose, Dr. juir., Guest Assist. Prof. She ensures research components in working with students through active participation in qualification upgrade seminars, scientific conferences and development of publications. She actively participates in various projects and scientific contract works. She is the author and co-author of a number of scientific publications. The qualification of D. Ose complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study course “Fundamentals of Law”.

The qualification of Inta Volodko complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study course “Mathematics”.

Larisa Iļinska, Dr. philol., Professor. She is the author and co-author of several scientific publications, including textbooks. He upgrades her qualification regularly by participating in seminars, conferences and professional qualification upgrade courses.

The qualification of L.Iļinska complies with the terms and conditions for the study programme implementation and the requirements of regulatory enactments, as well as ensures the achievement of the aims and learning outcomes of the study programme and the study course “German Language”.

In general, the data show the qualifications of academic staff. According to the qualifications, the quality of study courses can be ensured by the academic staff. Many members of the academic staff also work directly in the geodesic and cartographic sector, thus transferring the skills and competences of practical work to the study programme.

Currently, there is one guest lecturer working at the study programme. Such academic staff members work at other universities but also conduct certain courses in the form of exchange in the study programme, thus ensuring mutual cooperation not only inside RTU but also with other universities. Training and qualification upgrade for academic staff take place through participating in conferences and seminars, attending different courses, participating as experts in the work of other organisations.

Every year, academic staff take an active part in methodological seminars organised at RTU and other universities.

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

The academic staff holding a degree of Doctor of Engineering Sciences and a degree of Master of Engineering Sciences or highly qualified professionals with the relevant work experience, whose characteristics are provided in their CV, participate in the process of implementing the professional Bachelor study programme. The list of academic staff and their CVs are attached hereto as Annex.

Academic staff comply with the requirements for the implementation of study courses. This is demonstrated by both their characteristics and CV, as well as by their scientific and methodical publications and the participation in scientific and methodical conferences organised internationally, by RTU and the Faculty of Civil Engineering.

Characteristics of the academic staff are provided in the table:

Nr.p.k.	Rādītāji	Skaits	Procent. atteicība%
1.	Amati:		
	Profesori	5	15,625
	Asociētie profesori	6	18,75
	Docenti	3	9,375
	Praktiskie docenti	4	12,5

	Viesdocenti lektori	1	3,125
	Lektori	8	25
	Pētnieki	3	9,375
	Vadošie pētnieki	1	3,125
	laborants	1	3,125
	Kopā:	32	100
2.	Zinātniskie grādi:		
	Zinātņu doktori	15	46,875
	Maģistri	17	53,125
	Cita(dipl.ing.)	0	0
	Kopa:	32	100
3.	Pēc vecuma:		
	līdz 30	2	6,25
	31-40	2	6,25
	41-50	14	43,75
	51-60	6	18,75
	virs 60	8	25
	Kopa:	32	100

In general, the data show the qualifications of academic staff. According to the qualifications, the quality of study courses can be ensured by the academic staff. The number of academic staff members who have obtained the Doctoral degree has not changed during the reporting period, i.e., Assoc. Prof. A. Auziņš, J. Zvirgzds, M. Kaļinka, and J. Kaminskis deliver lectures within the study programme. Three members of the academic staff are now Doctoral students, which indicates the growth of the number of Doctoral degree holders in the near future. The study programme has more than 46.88% academic staff holding a degree of Doctor of Engineering Sciences. A number of lecturers work parallelly in the geodetic and cartographic sector, thus transferring their practical work skills and competences to the study programme.

In terms of the age structure, the number of academic staff whose age exceeds 60 has decreased,

i.e., currently they form 25% of the total number of academic staff. The number of academic staff members who have reached the age threshold of 41-50 has increased, i.e., currently they form 43.75% of the total number of academic staff. Administration of the study programme attracts Doctoral students to the study programme. At present, their number is 3, which is 9.38% of the total number of academic staff.

In order to ensure and increase the impact of research activity and staff development in the study process, RTU management signs agreements regularly once a year with each RTU faculty, setting the specific quantitative indicators in the field of studies, research activities and valorisation.

Changes in the composition of teaching staff have significantly improved the quality of studies in the study programme Geomatics. Experience and increased involvement in professional organisations have increased.

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

Not applicable.

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

Not applicable.

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

The interrelation among the study courses and their logical, sequential learning are essential to

achieving the learning outcomes of the study programme. In general, a framework has been established to promote cooperation between faculty and university staff, which provides regular academic conferences and professional training seminars for the development of methodological competencies. An example is the academic conference of 27 April 2018 entitled “Integration of Methodological and Scientific Work into the Study Process”. Such measures contribute to the development of the academic staff and promote more efficient cooperation in achieving results and improving study courses.

The study programme carried out by the Department of Geomatics is interdisciplinary. The content of the programme consists of civil engineering, geodesy, geoinformatics, cartography, land survey, geography, other cross-sectoral engineering, geophysics and environmental protection. As a result, academic staff from different organisational units are involved in the implementation of study courses and professionals in the sector are attracted. For example, academic staff of the Department are involved in the implementation of the study course “Fundamentals of Geomatics”, while individual themes are presented by invited guest lecturers from industry enterprises.

Practical classes within the study course are implemented by academic staff together with professionals from the industry. Guest lecturers from the industry leading companies are invited to deliver the study courses, for example, leading specialists of LTd. Metrum, project managers of Ltd. GeoStar, consultants of Ltd. GPS Partners, experts from the State Land Service and Rural Support Service, as well as leading specialists from the Latvian Hydrographic Service, various specialists in geospatial information systems and others.

Cooperation among academic staff is also demonstrated by the fact that prior to the beginning of the semester, academic staff meet, consult and agree on the content so that there is no duplication of the curriculum of the study courses.

The sequence of study courses is followed to progress from the simplest and general education to a more complex and professional level, enabling interlinking and improving development to be ensured, as well as reaching certain degree of specialisation.

After each semester, the department responsible for the study programme implementation evaluates the progress of the study process and the learning outcomes at a meeting. Student surveys on the quality of study courses play an important role in this process. Based on an analysis of the current situation, solutions are found. For example, adjustments have been made to the structure of individual study courses in order to avoid partial duplication and improve interconnection between the study courses, or changes to the content of the study programme have been proposed for its development.

The ratio of students to teaching staff within the programme is 2.3 (or 20 teachers are employed per 46 students). We are working to improve this relationship.

Annexes

III - Description of the Study Programme - 3.1. Indicators Describing the Study Programme		
Sample of the diploma and its supplement to be issued for completing the study programme	RBCE0 pielikumsLV-ENG.zip	RBCE0 pielikumsLV-ENG.zip
For academic study programmes - Opinion of the Council of Higher Education in accordance with Section 55, Paragraph two of the Law on Higher Education Institutions (if applicable)		
Compliance of the joint study programme with the provisions of the Law on Higher Education Institutions (table) (if applicable)		
Statistics on the students in the reporting period	5. pielikums Studiju statistika ENG.pdf	5. pielikums Studiju statistika 1.2.pdf
III - Description of the Study Programme - 3.2. The Content of Studies and Implementation Thereof		
Compliance with the study programme with the State Education Standard	Annex 6.pdf	6.pielikums.pdf
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard or the requirements for professional qualification (if applicable)	7.pielikums_salīdzinājums ar profesijas standartiem EnG.pdf	7.pielikums_salīdzinājums ar profesijas standartiem.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	8.pielikumsENG.pdf	8.pielikums.pdf
The curriculum of the study programme (for each type and form of the implementation of the study programme)	Annex 9.pdf	9.pielikums.pdf
Descriptions of the study courses/ modules	10.p.ENG.pdf	10.p.Lv.pdf
Description of the organisation of the internship of the students (if applicable)	Internship_Management_Procedure[7678].pdf	Prakses_organizesanas_kartiba[7679].pdf
III - Description of the Study Programme - 3.4. Teaching Staff		
Confirmation that the academic staff of the doctoral study programme includes not less than five doctors, of which at least three are experts approved by the Latvian Council of Science in the branch or sub-branch of science in which the study programme intends to award a scientific degree (if applicable)		
Confirmation that the academic staff of the academic study programme complies with the requirements specified in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions (if applicable)		

Architecture (43581)

Study field	*Architecture and Construction*
ProcedureStudyProgram.Name	*Architecture*
Education classification code	*43581*
Type of the study programme	*Academic bachelor study programme*
Name of the study programme director	*Uģis*
Surname of the study programme director	*Bratuškins*
E-mail of the study programme director	*ugis.bratuskins@rtu.lv*
Title of the study programme director	*Dr. arch*
Phone of the study programme director	
Goal of the study programme	*Academic Bachelor Study Programme "Architecture" is aimed at providing students with the basic knowledge and skills needed for engagement in the practical work under the guidance of a certified architect or continuing studies at professional (European Master) level, in accordance with international and national regulations:* ** UNESCO/UIA Charter for Architectural Education,* ** Rules No 264 of the Cabinet of Ministers as of 23rd May 2017 on "Rules on Standard Classification of Occupations, basic tasks that comply with the occupation and basic demands of qualification".*

Tasks of the study programme	*The tasks of the study programme are:* *• teach students the ability to create architectural designs that satisfy both aesthetic and technical requirements;* *• to ensure overall knowledge of the history and theory of architecture and the related arts, technologies and humanities;* *• to ensure overall knowledge of fine arts as an influence on the quality of architectural design;* *• to provide basic knowledge of urban design, planning and the skills involved in the planning process;* *• to ensure overall understanding of the relationship between people and buildings, and between buildings and environment, and of the need to relate buildings and the spaces between them to human needs and the choice of adequate scale;* *• to ensure overall understanding of the profession of architect and the role of the architect in society, in particular the social factors;* *• to ensure basic understanding of the methods of investigation and preparation of the brief for a design project;* *• to provide overall understanding of the structural design, constructional and engineering problems associated with building design;* *• to provide basic knowledge of physical problems and technologies and of the function of buildings so as to provide them with comfortable internal conditions and protection against the climate;* *• to provide the necessary design skills to meet requirements of building contracting authority within the constraints imposed by cost factors and building regulations;* *• to ensure basic knowledge of the industries, organisations, regulations and procedures involved in implementation of design concepts into buildings and integrating plans into overall planning.*

Results of the study programme	*The study programme graduates:* ** are capable to work out aesthetically and technically adequate sketches of single-function residential and public buildings;* ** have overall knowledge of art and architecture history and theory of architecture and the related arts, technologies and humanities, as well as in heritage conservation and protection guidelines;* ** have artistic skills which affect the quality of architectural design;* ** are familiar with the basics of Territorial Planning and Urban Design;* ** are familiar with mutual interaction between people and buildings, environmental context, and have adequate skills in a choice of the appropriate scale;* ** have overall knowledge of the profession and impacts in creating urban development, as well as understand the role of architect in modeling social climate in the urban space;* ** knows pre-design research methods and data selection principles;* ** have the basic knowledge of general principles in structural design;* ** have overall knowledge of the technologies that provide the building with comfortable interior climate and protects interior from external climatic effects;* ** know how to design buildings and structures according to customer requirements, regulations and restrictions.*
Final examination upon the completion of the study programme	*At the end of the programme, bachelor's degree applicants develop a theoretical study on a chosen topic with elements of practical modelling, in which the use of skills and abilities acquired during studies is confirmed purposefulness. The bachelor's thesis is defended by the bachelor's thesis defence commissions in open sessions and is evaluated on a 10-point scale.*

Study programme forms

Full time studies - 3 years, 6 months - latvian

Study type and form	*Full time studies*
Duration in full years	*3*
Duration in month	*6*
Language	*latvian*
Amount (CP)	*140*
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)	*Bachelor Degree of Engineering Science in Architecture*
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

3.1. Indicators Describing the Study Programme

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

The Bachelor study program "**Architecture**" (further referred to as "the Study Program") is an undergraduate study program in architecture that provides students with the general knowledge, skills and qualifications to conduct professional practice under the guidance of a certified expert (architect).

During the reporting period, the program was modified in order to improve the study program and to provide students with the theoretical knowledge and necessary basic skills in the profession in the best way possible. Since the receipt of the previous study field accreditation sheet, according to expert recommendations, the compulsory part of the study program was supplemented with the engineering study courses, which previously were studied within the professional Master study program. Thus, for instance, the study courses "Electrical systems for architects" was moved from the professional Master study program to the academic Bachelor study program and all structural system courses are combined in BBK740 "Building structures" to ensure all study courses related to constructions and utility systems are acquired within the undergraduate study program.
Part A of the study program was supplemented with the study course SDD 701 "Innovation and entrepreneurship", AAP712 "Sustainability Principles in Architecture and Construction", and AAP708 "Urban Liability".The study courses BMT121 "Study of Architecture Material Science" and BBM301 "Basics of building mechanics" were moved to the compulsory part.
While ATM301 "Drawing III" and BKO115 "Basics of computer training" were moved from the compulsory to the compulsory elective part. The study course "Fundamentals/Basics of Law" was moved to section B2 of the study courses on Humanities and Social Science. Section C of elective study courses and section B2 of the study courses in Humanities and Social Science was reduced by 2 CP.

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

The study program "Architecture" corresponds to the study direction "Architecture and Construction" and students acquire the necessary knowledge in the field. The title of the study program, the degree to be obtained, the professional qualification, the aim, the tasks, the study results and the admission requirements are interrelated and appropriate.

The title of the study program “Bachelor's study program Architecture” follows from the qualification obtained as a result of studies, which corresponds to the bachelor's degree obtained in studies as a result of studies.

The volume of the study program is 140 CP or 210 ECTS, and the nominal length of full-time studies is 3 years 6 months. The study program is implemented in Latvian. To promote the mobility studies, specific study courses can be offered in English. The program’s alumni are awarded a Bachelor degree (Bc) in Humanities and Arts “Music, Visual Art and Architecture” after viva voce of the graduation papers.

Students in the study program are matriculated through a competition, based on the RTU Admission Regulations. The admission rules determine the procedure by which the results of the high school's centralized examination and additional entrance examination in drawing form the ranking of each student for the competition. Information about admission and the corresponding regulations are available on the RTU website

The target audience of the study program is applicants with an in-depth interest in studying the principles of environmental design and in the entrance examination demonstrates the skills of spatial analysis and the ability to graphically represent the environment and details.

The enrolled students are introduced to the study procedure at RTU and the requirements of the program by organizing special introductory classes. The necessary consultations on the study process are also provided by the director of the study program and the administrators of the study office

Programme code 43581 complies with Cabinet of Ministers Regulation No 322 Latvian Classification of Education. The first and second levels of classification, represented by the first two digits of code 43 are academic education (bachelor's degree), to be implemented after obtaining general or professional secondary education. The third, fourth and fifth levels of classification (thematic groups, subject areas and programme groups), denoted by the next three digits 581, are Architecture and urban planning (58 stands for Architecture and Civil Engineering).

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

The economic and social substantiation of the study programs is based on performed industry surveys, which are regularly performed on annual basis by the Ministry of Economics, and it is aimed at following up the development trends of the architecture and civil engineering field, including fluctuations in the increase of the construction and the indices of increase of the construction costs, in order to identify factors hindering development of the industry and eventual overheating risks in a timely manner, as well as forecasting the production scope and costs in the next years by applying forecasting methods. The survey reveals that during the whole period from 2020 to 2024 the experts and combined forecasts predict further increase of the industry costs. During the period from 2020 to 2022 this increase could be estimated within the a range of 1% to 5% per year, and in 2024 it could achieve 6%. According to the forecast the biggest increase of costs relates to labour costs where the combined forecast predicts a general increase of 8% to 10% per year over the period from 2020 to 2024. As regards sub-fields, in 2020 a decrease of the industry costs is predicted in the construction of residential and non-residential buildings, as well as in the construction of roads and highways. The most rapid increase is predicted in the construction

of bridges and tunnels. An increase of costs in all the sub-fields is forecasted as from 2022 by the construction of bridges and tunnels leading with an annual increase of 5-7%.

The industry researchers have concluded that also defects and deficiencies in construction design documents and insufficient scope of preliminary studies present risks of increase of prices on the level of individual sites in the industry of architecture and civil engineering. In order to mitigate this risk, it is important to implement the building information modelling (BIM) system in Latvia as soon as possible, as it can considerably improve the quality of construction design documents, contribute to predictability of construction, optimise organisation of construction works and their sequential performance, reduce construction terms and improve efficiency of project management and supervision.

The architecture and civil engineering industry has experienced very fast development as from 2017. Its growth amounted to 19.4% in 2017 and to 21.9% in 2018; construction volumes increased in all the core groups of construction during the last year. Both availability of the EU funding and private investment encourage the industry growth. Attraction of employees in the industry has restarted since 2018, the number of employees was 74.6 thousand last year accounting for 30% increase compared to 2010, however, the pace of the growth was lagging behind that of the production growth. The wages of employees have increased considerably in the industry during the last two years and last year they amounted to 94.6% of the mean wage in the national economy.

There are 3 study programs within the sub-direction "**Architecture**", the academic Bachelor, Master and Doctoral program. The Bachelor and Master programs jointly provide designing skills and other theory and practical knowledge in related industries to students. The majority of graduates of the study direction work in regulated fields in the Republic of Latvia where the independent practice certificate can only be obtained by the persons possessing the professional Master level education.

The architect's education has been provided by RTU since 1869 and it has undergone substantial development and improvement, at the same time maintaining the local tradition and character, which can be observed best in the constructed environment. In Latvia the architect's education can also be acquired at the Business, Art and Technology University RISEBA in the Bachelor and Master study programs, and the education of the landscape architect is offered by the University of Agriculture of Latvia. In comparison to the architecture study programs of universities of other European countries, the architect's education at RTU is characterised by long-standing tradition and high quality, by ensuring succession of knowledge and experience, which is based on the balanced academic environment and staff to a large extent. In the Bachelor program students acquire the basic knowledge of architecture in Latvian. In comparison to other architecture study programs available in Latvia and abroad, the academic staff of the architecture program at RTU provide the set of theory and practical knowledge which is recognised in Europe and most appropriate for the Latvian situation.

Graduates of the study program continue their studies in master's level programs, during which an internship takes place and 90% of students continue to work in their internship places even after graduation.

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

During the reporting period, the number of students and newly enrolled students in the study program remained stable. Every year approximately 50-55 students are enrolled in the study program. During the reporting period, 40 students have enrolled annually in the state budget-funded seats and 13–24 students – to the seats with tuition fees. Every year 146 students on average took state budget-funded seats and 53 students paid tuition fees at the study program. All students were studying in Latvian.

Every year on average 44 students complete the study program with a diploma. The drop-out rates due to academic arrears are relatively low –2 students per year on average. While 16 students on average are expelled and do not complete their studies due to other reasons – busy work schedules, family circumstances, etc.
Analysis of the dynamics in the number of students in relation to trends in the sector shows that in the future the study program will also feature a stable number of students and possible growth.

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

3.2. The Content of Studies and Implementation Thereof

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

Students at the study program acquire general knowledge and skills to get the necessary professional competence, as well as the skills to make use of the accumulated knowledge and competence in practice. The study program has been outlined so that the students could acquire both theoretical and practical components of architecture during their studies, as stated in the EU Directive 2013/55, amending EU Directive 2005/36 “On the recognition of professional qualifications”:

- Skill to develop building projects meeting the aesthetic and technical architectural requirements;
- Knowledge of the history and theory of architecture and related art, technology and humanities, as well as awareness about the importance of conservation and protection of the

cultivated and heritage landscapes;
- Skills in fine arts that have an impact on the quality of architectural designs;
- Knowledge of city and territorial planning, as well as of planning in the related sectors;
- Understanding of the relationship between people and buildings, as well as of the importance of environmental context and selection of adequate scale;
- Understanding about an architect's work and the role of architect in the society, especially, social factors;
- Understanding about research methods and data collection for architectural design;
- Understanding about design of construction works, construction and engineering issues related to construction projects of buildings;
- Knowledge about building physics and technologies that ensure comfortable indoor climate in the buildings and protect inner premises from external environment in the context of sustainable development;
- Skills to design buildings according to commissioner and user requirements by following the limitations set by regulations for building construction and expenditures,

Knowledge about industries, institutions, rules and procedures related to the implementation of design concepts and provision of the cross-compliance between different levels of planning.

The syllabi of the study courses are subordinated to the aim of the study program – to ensure students with the basic set of knowledge and skills necessary to start practical work under the guidance of a certified architect or to continue studies for obtaining professional architect's qualifications according to the provisions of international and national regulations. In each academic term, design is the major study course with the biggest academic volume, which coordinates other study courses and their curricula.

The Bachelor study program, by summing its curricula with the curricula of the professional Master study program, in general, meets the requirements set in the international and national binding provisions and regulatory recommendations for architectural education.

The study program provides cross-linkage between the information included in the study courses, learning outcomes, set aims, methods, as well as linkage of every study course with the aims and learning outcomes of the study program. The aim of the study program has been set based on the recent developments in profession, as well as on the needs of the economy and society. The program tasks have been structured to allow training of students according to the levels of Latvian qualification framework (LQF), as well as to promote competitiveness of the students in the changing socio-economic environment and international labor market.

The study program is implemented in the form of lectures and practical classes, allocating significant time for self-studying, whereas diverse aspects of spatial design are acquired in detail. The curriculum of the study program has been designed to meet the requirements of the regulations and elaborated in accordance with RTU Senate decision "On the unified requirements in respect to the study programs".

The length of study is 3.5 years, with 7 academic terms, that embrace compulsory study courses, specialization and elective study courses. Upon completion of their studies, students have to develop a Bachelor Paper.

The study program adopts a variety of principles for study course selection and acquisition. The courses meant to ensure the mandatory minimum knowledge, skills and competences for the architect's job are included in the compulsory part, and they are acquired in full by all students. The study courses that increase knowledge and awareness or allow for deeper acquisition of specific skills and competences in a certain field are included in the compulsory elective part and students

should select them at least within the framework of the study program limits.

The planned volume of compulsory study courses in the study program is 108 CP (162 ECTS). Compulsory study courses increase students' knowledge and skills in spatial design, including urban planning and architecture details at various scales, as well as develop knowledge and competence in scientific research methods and their application to spatial design art. Compulsory elective (specialization) study courses in the study field (20 CP or 30 ECTS) are designed to let young specialists build up expertise in the chosen field of specialization.

The structure of the study promotes balanced acquisition of architectural and project design skills. It is implemented in a consistent manner as a targeted synthesis of knowledge acquired at the lectures and seminars and design skills acquired during design work. Skills in the specialized subjects are developed and improved via individual tutorials. The lecture courses regularly include materials based on innovative theoretical findings and related to the latest planning and design techniques and developments in the construction technologies.

The lecture courses are general-theoretical, they are supplemented with research work elements in the form of reports, research and other kinds of self-studying. Practical guidance is individual, whereas each student develops an independent study project in the framework of a common topic. Acquisition of knowledge, skills and competencies in social subjects is supervised at the individual tutorials. Attendance of practical classes is mandatory for all students during the entire study period.

Within each study course, students must pass planned assessment tests, complete individual home assignments and develop term papers. Only the students who have fulfilled all requirements of the study course are admitted to the examination. Results of exams and tests are registered in the electronic database of RTU Study Management System.

Organizational units of the Faculty of Architecture (AF) in cooperation with other organizational units of RTU implement the study program acquisition process in the form of lectures, laboratory works, seminars and other activities (term papers, independent home assignments, tests, etc.). The academic staff supervises study projects maintaining the ratio of students to academic staff at 1:8–1:10, which is recognized by other high schools of architecture as optimal. The study process in computer classes is provided by the technical support staff.

During elaboration of the Bachelor Papers, presentations are organized, where students present their research progress to responsible members of the academic staff.

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

Not relevant

3.2.3. Assessment of the study programme including the study course/ module implementation methods by indicating what the methods are, and how they contribute to

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

The study program is implemented bringing together acquisition of theoretical and practical knowledge and skills in the form of lectures, seminars and practical classes. The acquired study courses and elaboration of the graduation paper within the study program are proportionally distributed across the academic terms to let them complement each other most efficiently, targeting students at the acquisition of knowledge and skills. In general, the study program and planning of each academic term is done focusing on the acquisition and advancement of the theoretical and professional skills by each student, working both individually and as a team.

Assessment of learning outcomes is made according to the regulation on the assessment of learning outcomes (https://international.rtu.lv/wp-content/uploads/sites/65/2021/02/04.-Regulation_on_the_Assessment_of_Learning_Outcomes.docx.pdf) and regulations on the final examinations at Riga Technical University (https://international.rtu.lv/wp-content/uploads/sites/65/2021/02/08.-Regulation_on_Final_Examinations_at_RTU.pdf) The academic staff in charge of the study courses select the structure of elective study courses, lecturing and assessment methods according to the course curriculum and program specificities, as well as student needs. Courses and seminars about new educational methods are organized for the academic staff, they are also offered professional advancement and training courses at the faculty, RTU and international scale. RTU Centre for Academic Excellence organizes activities for development of the academic staff on the university level.

The methods employed at the study program promote achievement of the aims and outcomes of the study courses and the study program based on the student-centered principles of education. The study program owes its value to a professional dialogue between the academic staff and students, involving students in the improvement of the curricula and methods of the study courses. Students can take part in improvement of the study process directly – expressing their aspirations to the academic staff of a certain study course, a department chair, the program director, or through representatives of the student self-government, whose representatives are members of AF Council, RTU Senate and RTU Senate commissions, as well as members of RTU Academic Assembly. AF relationships with students are based on the principles of mutual confidence, respect and fairness. This imposes students both extra obligations and offers additional rights. Students have an opportunity to influence their learning process, to exercise their autonomy, to provide feedback on the study process, aligning it with their professional growth interests. The feedback between students, academic staff and program administration is greatly influenced by AF student self-government that takes active part in all mentioned processes and makes the annual assessment of the academic staff.

At the beginning of each study course, the academic staff inform students about the study course acquisition requirements, including the recommendations of the students from the previous years, and familiarize students with specific evaluation criteria of the study course. They are published in the portal ORTUS. At least once per academic term, students evaluate the performance of the academic staff in ORTUS environment by answering the survey questions. These include evaluation

of the study process, individual tasks, acquired skills, the academic staff's attitude and cooperation with the students. Survey questionnaires are anonymous. The program director regularly discusses current issues of the study process and quality, involving in these discussions other interested parties – vice-deans for studies and research, mobility coordinators, etc.

In order to ensure integration of the acquired knowledge, competences and skills of the graduates, elaborating and implementing the study courses, a special focus is made on:

- Reflection of the topical case studies in the study program curriculum (at the level of lectures and practical classes), including analysis of real challenges and problems faced and solved by the study program's partners within the curriculum of a particular study course;
- Integration and cross-disciplinarity of the study courses and the study program;
- Optimization of the curriculum in cooperation with external experts and visiting academic staff.

Individual studies play an important role. Description of the course of autonomous studies is included in the description of the study course as a mandatory part. Students' skill to learn individually is systematically developed within all the study courses. Students acquire skills of practical and research work by regular use of literature and internet resources, including international scientific data bases, which are available at RTU Library with electronic access to ORTUS, to develop successfully research papers, as well as Master Theses with an integrated diploma design project.

AF runs a transparent system promoting development of the academic staff. Organizational units of RTU, including Personnel, Research, International Relations Departments, and the Centre for Academic Excellence regularly inform the academic staff about opportunities to advance their competencies in the field of scientific research, methodological and teaching skills, general competencies (foreign languages, information technologies, public speaking and presentation skills, etc.), and specific professional activities. ORTUS accumulates the information about scientific activities of the academic staff. To offer high-quality teaching, seminars on the teaching methodology are organized for academic staff of RTU, which address opportunities of application of different study methods, experience and good practices.

AF regularly organizes seminars for the academic staff about the findings in the field of achieved learning outcomes, as well as about student-focused principles of education and implementation solutions. Such an approach is used in daily work – representatives of the academic staff constantly monitor the quality of learning outcomes based on the most recent knowledge in the sector and opinions of students. The Vice-Dean for Academic Affairs is the person in charge.

The academic staff of the study program regularly improve the study curricula by introducing yet more new learning organizational practices into the study process. Entering the single European architectural educational area allows both academic staff and students to be mobile and extend their knowledge and gain experience at the universities abroad, as well as provides wholesome work opportunities in a rapidly changing international labor environment. The study process integrates international experience, AF learning environment and infrastructure are adapted for the groups of students with various professional interests, maintaining stable quality of studies.

3.2.4. If the study programme envisages an internship, describe the internship opportunities offered to students, provision and work organization, including whether the higher education institution/ college helps students to find an internship place. If the study programme is implemented in a foreign language, provide information on how

internship opportunities are provided in a foreign language, including for foreign students. To provide analysis and evaluation of the connection of the tasks set for students during the internship included in the study programme with the learning outcomes of the study programme (if applicable).

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

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

Topics of the graduation papers are selected according to their relevance for the industry in Latvia and in the world. In Bachelor Paper research, each student can choose the topic and the field of one's research independently and according to one's interests after consultations with the academic staff. With a relatively similar frequency, the paper topics covering all the acquired fields of architecture are selected – territorial planning, landscape architecture, 3D design, interior design, building rehabilitation projects, administrative work activities. Research locations are situated in different regions of Latvia and during the reporting period a lot of projects were executed abroad.

Every academic year, the papers focusing on the historical research and restoration of historical territories or construction volumes are developed. For example:

- Historical can roofing, its use opportunities in modern architecture;
- Examples of historical farmhouses in the Latvian countryside;
- Elements of vernacular architecture in modern public buildings;
- Adaptation of apartment buildings built in the first half of the 20th century to the needs of the 21-century citizens;
- Half-timbered construction in Latvian architecture before the end of the 19th century.

When developing their graduation papers, many students are interested in the issues and topicalities of urban planning:

- Sustainable rainwater utilization solutions in large residential areas;
- Outdoor public space of Riga historical center in the context of human perception scale;
- Pedestrian-friendly environment and principles of its formation;
- Pedestrian access and mobility improvement in the urban environment;
- Development opportunities for public waterways in Riga;
- Outdoor space of apartment houses in the context of private and public needs;
- Mobility supporting infrastructure on railway lines of metropolitan agglomerations;
- Use of wind analysis in spatial design of environment;
- Aquatecture and its role in the development of waterfronts;

- The compact city concept as a sustainable urban planning solution.

The principles of urban development and landscaping are also researched:

- Wall gardening system in the urban environment;
- Potential of city parks in the area of Pētersala - Andrejsala;
- Green-Blue Structure in multi-storey residential areas;
- Green structures in the regeneration of dense city;
- Green roof solutions in Latvia in the context of global and European experience;
- Green public outdoor spaces in Riga neighborhood.

Equally relevant is project design of new construction volumes based on the research in the building typology, for example:

- Spatial structure of Riga student dormitories;
- Value of the demolished building of the restaurant “Jūras pērle” in Jūrmalā;
- Modern apartment planning trends;
- Acoustic comfort of buildings and environment;
- Architecture of living container houses;
- Development opportunities of industrial heritage in Dzirciems, Riga.

Every year Bachelor papers dedicated to the research of innovative architectural solutions or process are developed, for example:

- Urban advertising – an essential element of today’s urban environment;
- Potential of timber in sustainable residential architecture;
- Participation of society in planning of urban environment and architecture;
- The role of social initiative in development of marginal public spaces;
- Under-bridge areas as potential public spaces in Riga;
- Sustainable technologies in the contemporary Latvian architecture;
- Light pollution in urban environment;
- Nap rooms in the work place;
- 3D scanning in the process of architectural design.

Assessments of the Bachelor Papers reflect students’ performance and the acquired knowledge and skills. 97% students complete the study program with their graduation papers assessed with grade 7 (“good”) or higher. 2% of Bachelor Paper are assessed with 10 or “excellent”.

Place and neighborhood identity, urban landscaping quality, public access to open urban spaces and diversity of public activities, mutual priorities of pedestrians and other traffic participants, role and place of public transport in historical centers of the city, quality of outdoor furniture, opportunities of modern technologies and urban design are the main topics of research in the Bachelor Papers, which attests their topic relevance in the context of the Latvian architecture.

3.3. Resources and Provision of the Study Programme

3.3.1. Assessment of the compliance of the resources and provision (study provision, scientific support (if applicable), informative provision (including libraries), material and technical provision, and financial provision) with the conditions for the implementation of the study programme and the learning outcomes to be achieved by providing the

respective examples.

In order to implement the study program and to achieve the learning outcomes both the physical infrastructure, and academic and research facilities are evaluated and supplemented on the annual basis, including printed and digital publications. To ensure as high learning outcomes as possible, for the period of active studies each student is provided with a constant work place in the design workshop. It is equipped with all furniture and equipment necessary for architectural work, including the necessary utility connections. According to the volume of the program funding, resource and software renewal and upgrade is performed regularly.

In order to update the contents of the course literature, the academic staff of the faculty develops and updates regularly the learning aids (for development of certain courses and laboratory works). Students have RTU and AF data storages at their disposal:

- RTU Scientific Library repository of books and periodicals,
- Resources of the construction branch of RTU Scientific Library,
- Resource room with wide and relevant range of learning and specialized literature, regularly updated,
- Archive of learning aids – project design office.

Information repository funds are updated and renewed regularly with top scientific and professional journals or periodicals and books in the field.

The Faculty of Architecture also has its own library and resource room with new and historic books on architecture and architectural drawings, available in the faculty building. It stocks over 30,000 publications, including books, periodicals, landmark and unique folios, maps, architectural drawings, etc. It also stores student graduation papers, and their digitalized archive.

Scientific and artistic innovation events are financed from RTU Scientific Development Fund. For instance, the international conference “Koka dienas” (2017 –2019), Forum Wood Building Baltic and other events attended by students. Within these events, researchers and students have an opportunity to acquire new knowledge, share their experience and establish contacts in a view of new research and artistic innovation projects.

Students and teaching staff also have access to online databases provided by the RTU library.E-resources for the study programme “Architecture”:

- **E-books:** Proquest Central, Ebscohost eBook Academic Collection, SpringerLink, MasterFILE Reference eBook Collection.
- **E-journals:** Ebscohost Academic Search Complete, Wiley Online Library, Ebscohost MasterFile Premier, ScienceDirect (Elsevier).

More detailed information is given in Criteria 2.3.1.- 2.3.3. of Section 3 of Part II.

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

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

The sources of financing of the study program are the State financing and the tuition fees of local students and it is distributed in proportion to the payments and development expenses. **2017/2018** in the study year the state funding - 257102 EUR and the tuition fee of local students - 112090 Eur. In total 369193 Eur - 70% state funding and 30% tuition fees for local students. The cost per student within this study program was 4876 Eur.

2018/2019. in the study year the state funding - 229608 EUR and the tuition fee of local students - 82594 Eur. In total 312203 Eur - 74% state funding and 26% tuition fees for local students. The cost per student within this study program was 5316 Eur.

2019/2020. in the study year the state funding - 424178 EUR and the tuition fee of local students - 103894 Eur. Total 528073 Eur - 80% state funding and 20% tuition fees for local students. The cost per student within this study program was 5104 Eur.

2020/2021 in the study year state funding - 461989.52 EUR and tuition fee for local students - 88560 Eur. In total 550549 Eur - 84% state funding and 16% tuition fees for local students. The cost per student within this study program was 5386 Eur.

Information on the minimum number of students in RTU study programmes is provided in the appendix of the self-evaluation report "On minimal number of students in study programmes".

Information on the funding distribution between the cost items is provided in the appendix of the self-assessment report "Funding distribution between the cost items".

Funding for the development of the study program is used centrally for the renewal of the scientific library fund, improvement and maintenance of shared auditoriums, public relations, program marketing activities, development and maintenance of information systems related to the study process, development of Ķīpsala complex and other activities. In addition, the available funding is also used for raising the qualification of teachers and exchanging experience, as well as for motivating students.

3.4. Teaching Staff

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

The qualification of the academic staff involved in the development of the study courses of the program meet the program requirements. The program involves highly skilled researchers and industry professionals. Alongside full-time academic staff, the program involves part-time assistant professors and lecturers – practicing architects, whose number varies depending on the number of students in the corresponding academic term. To ensure an optimal student-academic staff ratio in specialized subjects, the program involves 6 part-time members of the academic staff on average.

Wide age variation in the academic staff allows the most effective transmission of the experience accumulated by the generations of lecturers and teachers. Senior professors have a minimum work load and they are assisted by younger colleagues, as their presence and advice are very significant factors in conservation of the academic traditions of the faculty. Still renewal of the academic staff is one of the main tasks of the managers of each organizational unit and faculty management as a whole. The policies of the academic staff selection, renewal and training are based on regular involvement of Master students, graduated Masters and PhD students in the study process.

Overall evaluation of the academic staff is given in sub-sections 3.5.-3.6. of the Study Field Report, Part II, Section 3 and the CVs of the academic staff members. Hereinafter the accent is put on qualifications and competencies of the academic staff involved in the implementation of the study program with the reference to specifics of particular study courses.

The qualification of the academic staff involved in the study program fully meet the study program requirements and regulations, ensure achievement of the goals of the study program and corresponding study courses and learning outcomes (see the CVs of the academic staff). The study program involves full-time RTU elected academic staff members, visiting lecturers and leading industry professionals. RTU elected academic staff is in charge of elaboration, curricula and update of the study courses. The responsible academic staff members are highly skilled professionals with the corresponding education and (or) professional experience. Implementation of the study courses involves a team of academic staff members, which can employ both full-time RTU academic staff members, industry professionals, and PhD students and visiting lecturers.

Professor, Dr. arch. Jānis Krastiņš is an architect, Dr. habil. arch., Professor, Head of the Department of History and Theory of Architecture, Riga Technical University, member of the Latvian Association of Architects (1970), Full member of the Latvian Academy of Sciences (1994), President of the Latvian Academy of Regional Architecture (2019). Member of the editorial boards of many scientific editions, scientific councils and official advisory bodies, implemented a number of architectural projects and investigations of cultural monuments, the author of more than 710 scientific papers published in Austria, Belgium, Czechia, Denmark, Iceland, Italy, Estonia, Finland, France, Germany, Latvia, Lithuania, the Netherlands, Norway, Poland, Portugal, Russia, Slovenia, Spain, Sweden, Turkey, United Kingdom and the United States of America, including 30 books on various aspects of history and theory of architecture.

Professor, Dr. arch. Uģis Bratuškins is an architect and RTU Professor since 2012; Dean of the Faculty of Architecture since 2007. University lecturer at the study courses of Architectural Design, Interior Architecture, Morphology and Research of Architecture, Building Typology and others. Over 80 scientific publications. LCS expert in Music, Visual Art and Architecture, the branch of Humanities and Artistic Science, scientific expert at Slovenian Research Agency (since 2015) and Romualdo Delbjanko Foundation (Florence, Italy, since 2008). Vice-Rector of the Nordic Baltic Academy of Architecture (since 2013), Member of the editorial boards of scientific edition of Vilnius Gediminas Technical University “Journal of Architecture and Urbanism” and scientific edition of Kaunas Technology University “Journal of Sustainable Architecture and Civil Engineering” (Lithuania), and

scientific edition of the Latvian Academy of Agriculture “Landscape Architecture and Art” and Riga Technical University scientific journal “Architecture and Urban Planning”, as well as a reviewer of MDPI (Switzerland) scientific journals “Sustainability” and “Energies”. He also works in the editorial board of the professional journal “Latvijas Arhitektūra” and as an external consultant of the popular science journals “Ilustrētā Zinātne” and “Ilustrētā Pasaules Vēsture”. Participant of the State Culture Capital Foundation (SCCF) Committee for Architecture and Design (2013–2015 and since 2020) and takes part in the work of the Council for Conservation and Development of Riga Historic Centre as an advisor. Member and member of the board of the Latvian Association of Architects (since 1989).

Professor Dr.arch. Sandra Treija is an architect and an RTU Professor. Doctor of Architecture (since 2006). Professional on-the-job experience as an architect-planner and project manager at Urban Planning Unit of the City Development Department of Riga City Council (1997-2001). Academic experience at RTU Faculty of Architecture in different academic positions (since 1998), from an assistant to a professor (since 2012), as well as in administrative positions – Vice-Dean for Academic Affairs (2001-2006), Vice-Dean for Research (since 2007). Developed and lead 8 study courses on urban development and spatial environment related topics for the students in a variety of specialties. Member and member of the board of the Latvian Association of Architects. Expert at the Latvian Council of Science: the field of activity – Humanities and Social Sciences, Artistic sciences, including Architecture: architecture, urban planning, sustainable development, urban ecology, urban landscaping, living environment. Coordinator of Docomomo national group. S. Treija regularly speaks at international conferences, author and co-author of over 50 scientific publications. Member of the editorial boards of the scientific journals “Architecture and Urban Planning” (RTU) and “Landscape Architecture and Art” (LLU). Reviewer of MDPI (Switzerland) scientific journals “Sustainability” and “Energies”. She has taken part in the international and national research projects, including the current ones – “Up-to-date Information Systems in Urban Regeneration”, Latvia-Lithuania-Taiwan Scientific Foundation; “Technological Solutions for Energy Efficiency of Buildings”, State Research Program; “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 concerned with sustainable urban development, housing problems, quality of living environment, urban regeneration issues.

Professional, academic and research activities provide a complex view of the current challenges in urban development, which in turn gives Professor the opportunity to address the latest theoretical and practical developments in the industry in the study process.

Assistant Professor, Dr. arch. Edgars Bondars is a member of the academic staff and a researcher at RTU Faculty of Architecture. Professional degree in architecture (2008), Master degree in Architecture (2009), Doctor of Architecture (2013) dealing with the topic “Spatial design in the context of bioclimatic factors”. Fields of research: bioclimatic design, energy efficiency strategies in architectural design. As an assistant, researcher or manager has taken part in 12 research projects, author of 23 various publications, including those in scientific and professional journals. Co-founder and member of the board of the architectural bureau RR.ES (since 2006), dealing with residential, public, and industrial building design. As an assistant or project designer has taken part in the development of at least 40 small and middle-scale architectural projects and draft projects.

Assistant Professor, Dr. arch. Ilmārs Dirveiks is a member of the academic staff at RTU Faculty of Architecture, Department of History and Theory of Architecture. Worked as a lecturer and assistant professor at the professional study program (2004-2015), but since 2015 has been an assistant professor. Professional degree in Architecture (1983), Master of Arts and Humanities

(2003), Doctor of Architecture with the thesis “The Window onto Latvian Architecture” (2010). Art conservator and senior master of artistic research in architecture (2018). Lecturer at the Art Academy of Latvia (since 2016). Lecturer in arts at Daugavpils University (2012-2018). Expert of the Scientific Council of the State Inspection for Protection of Cultural Monuments (2008-2020). Riga Castle renovation board member (since 1995). Lecturer at cultural awareness workshops on the issues of conservation and renovation of historical buildings (since 1983). Lecturer at the international workshops and conferences. Author of approximately 40 publications, including those in scientific and professional journals. Since 2006, an architect at the research and design office “Arhitektoniskās izpētes grupa”. Participated in project design for restoration and conservation of historical buildings. Fields of research: History and Theory of Architecture and Arts, Structures and Materials of Historic Buildings, Conceptual and Strategic Issues of Architectural Heritage Conservation. As a researcher and manager conducts artistic research in architecture, research in cultural history and construction history and provides expertise at typologically different sites of 13-20 centuries, such as Riga, Ventspils, Limbaži, Svēte, Lielstraupe Castles, Skaistkalnes Monastery, Nurmuiža, Šeppmuiža, Ungurmuiža, Kabile, Eleja, Valdgale, Nordeķu, Liepupe, Preiļu, Riebiņu, Varakļānu, Pope manors, etc., buildings, in Riga: (“Dannenstern” House, in 23 and 26 Mārstaļu Street, 21 Pils Street, 6 M.Pils Street, 16 Smilšu Street, 14 Alksnāju Street, 23 Elizabetes Street, “Jēkaba kazarmas” barracks etc.), Lestene church, Ķemeri sanatorium, buildings in Cēsis, Bauska, Liepāja, Kuldīga, Ventspils, and other Latvian towns. Architect-researcher within Riga St. Jackob’s Cathedral renovation project (since 2014). Architect-researcher in Riga Castle research (since 1994).

Marts Švēde is an assistant professor at the professional study program at RTU Faculty of Architecture. Academic experience since 1985. Lecturing in architectural design to students of 1st, 2nd, and 3rd years, spatial and interior design. Development and enhancement of learning tasks and methodology, thematic and introductory lectures to students. Supervision of Master and Bachelor theses, as well as of professional architect qualification papers (41 papers). Professional work of an architect: the main architect of design groups in the design bureaus “Vincents”, “a-part” and “G74”, author of over 60 built sites.

Aleksandrs Beznosiks is a lecturer of AF Department of Graphic Art and a practicing designer. Graduated the Department of Functional Design of the Art Academy of Latvia in 2008 with a degree of Master of Humanities in Art, Design and Functional Design. Academic experience at RTU Department of Graphic Art from 2013. Teaching of practical classes in "Drawing + basic design graphics", "Drawing basics", "Basics of graphic analysis", "Basics of graphic art". Alongside the teaching practice took part in the development of learning aids at the Department of Graphic Art (DGA), as well as in elaboration of RTU, AF and DGA interior design projects. Professional experience of a practicing designer since 2003. Work with design projects in cooperation with such design bureaus, companies and organizations as Rīga Free Port authority, "H2E" LLC, "DD studio" LLC, "AD production" LLC, "PAA" LLC, Si "OSC" LLC, "AHK" German-Baltic Trade Chamber and other.

Dina Baumane is an assistant professor at the professional study program at AF Department of Graphic Art since 2013. Master of Arts (2000). DGA Lecturer in Drawing, Painting, Graphic Art, Basics of Graphic Analysis, Drawing Basics. Watercolor painting master classes for architects, painting master classes for textile designers. Lecturer at the ERASMUS international student exchange program. AF reviewer of Bachelor papers. Member of the Artists' Union of Latvia since 1992. Member of Lat-InSEA (International Society for Education through Art) since 2015. Participant and referent at InSEA International conferences (Lisbon, Portugal, 2015; Aalto, Finland, 2018; Valetta, Malta, 2019). Publication in the proceedings of the 9th International scientific conference ‘’Person. Color. Nature. Music.” (Mark Rothko Art Centre, Daugavpils, Latvia, 2016). Participant of national and international exhibitions since 1988. Fiber artist, member of the Association of Latvian

Textile Artists since 2000. Participant of international paper moulding symposia and exhibitions (2019; 2020). Organizer of watercolor painting exhibitions in AF rooms displaying works by students of the Faculty of Architecture who specialize in materials technologies and design (2017; 2019).

Sarmīte Barvika (Prof. Mag. Arch., MBA) is a researcher and lecturer at RTU Faculty of Architecture specializing in spatial planning and urban development modelling. Formerly, a lecturer at RTU Faculty of Engineering Economics and Management. Author of many publications, permanent referent at national and international conferences, expert in a variety of EU and national projects. Supervisor and reviewer of many Bachelor and Master theses. Visiting lecturer at Aalto University, Kaunas Aleksandras Stulginskis University and Tallinn University of Applied Sciences. Researcher within ERASMUS exchange program at the University at Buffalo (NY) and Vilnius Gediminas Technical University. Scholarship holder of Lincoln Institute of Land Politics (2013, 2018). Associate member of IAAO (2012-2018), TAIEX expert, Baltic Open Solution Centre expert (2017-2018), URBAX 21 game presenter, member of the Latvian Association of Territory Planners. S. Barvika started her career in architecture specializing in conservation of architectural heritage, and later in GIS. She worked in the State Land Service and was one of the first managers of a large-scale municipal land evaluation project.

The responsible instructors also invite visiting lecturers (industry professionals, company managers) and PhD candidates. During the reporting period, 75 visiting academic staff members from 22 countries, also 8 visiting academic staff members from 6 non-EU countries participated in the study program implementation.

Selection of the academic staff members is based on their scientific and teaching experience, fields of research and achieved results with regard to specifics of the study program and study courses. The academic staff involved in the implementation of the study program conducts research through participation in international research projects and regularly publishes research results at internationally recognized publishing platforms. The academic staff are also given an opportunity to advance their professional competencies and extend international cooperation experience through the mobility program Erasmus+, COST or others, which promote the single European architectural educational area, and through the on-the-job training.

Other RTU organizational units also take part in the program apart from the Faculty of Architecture. The academic staff of the study program regularly participates in professional training activities initiated by RTU organizational units, as well as in the seminars on the latest updates in the field of studies and research organized by the Faculty of Architecture. Activities that promote positive impact of the academic staff on the program quality and ensure relevance of the study program to the industry and regulatory requirements are organized on a regular basis.

The competence of the academic staff and industry professionals involved in the implementation of the study program allows effective delivery of necessary knowledge and skills to future architects, and comprehensive evaluation of the quality of the acquired knowledge.

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

The academic staff of various levels and professional qualifications are involved in the implementation of the study program to make the implementation of the study courses as high-quality and student-centered as possible. Altogether the implementation of the professional Master

program involves over 30 members of the academic staff and visiting lecturers who advance their knowledge and competencies to improve the quality of studies, to optimize them according to the industry demand, to modernize and to digitalize program curriculum in order to provide students with up-to-date architectural education.

During the reporting period, 6 members of the academic staff were involved in the implementation of the study program, contributing to a range of research topics and extending an opportunity for the students to choose professionally industry and research fields appropriate for thesis supervision. The qualifications of the academic staff involved in the delivery of the program study courses meet the study program requirements. The program employs highly skilled researchers and industry professionals. Alongside full-time academic staff, part-time assistant professors and lecturers – practicing architects participate in the implementation of the study program, their number varies depending on the number of students in the corresponding academic term. To ensure an optimal student-academic staff ratio in the specialized subjects, the program employs 6 part-time members of the academic staff on average.

The policies of selection, renewal and training of the academic staff are based on regular involvement of Master students, graduated Masters and PhD students in the study process.
During the reporting period, the teaching staff in design classes has changed in order to expand the opportunities for cooperation with practicing architects. The composition of Bachelor's thesis defense commission has also changed in order to obtain a more objective assessment of students' theses.

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

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

3.4.5. Assessment of the cooperation between the teaching staff members by specifying the mechanisms used to promote the cooperation and ensure the interrelation between

the study programme and study courses/ modules. Specify also the proportion of the number of the students and the teaching staff within the study programme (at the moment of the submission of the Self-Assessment Report).

Cooperation between the members of academic staff at the study program is maintained both during the semester delivering the study courses and planning the changes to the study program and its development for the coming semesters and within the study program in general. In order to provide daily communications and promote cooperation among the academic staff and PhD students, the appropriate environment has been established to let the academic staff members meet and maintain formal and informal communication, to promote improvement of the study courses and their mutual integration.

Updating of the study courses is made regularly based on both student suggestions and trends of industry development. During implementation of the study courses, regular meetings and curricular meetings of the academic staff take place, where they share their experience concerning the themes of the study courses, as well as elaborate and update the curricula, adopting themes, fields, responsibilities and regulatory requirements by mutual agreement. The approval of study courses involves all academic staff working at a certain study course, thus ensuring that the themes within the study program are continuously enhanced and updated in cooperation with the involved industry professionals.

The study courses in the compulsory and compulsory elective parts are planned by thematic blocks. These blocks are cross-coordinated so that the study courses do not overlap and students are provided with the necessary basic knowledge in each field. Cooperation between the academic staff members at the study program is based on understanding of the thematic structure of the study program. Cooperation mechanisms are selected based on individual loads of the academic staff members, thematic interrelation of the study courses (consistency, continuity, complementarity), previous cooperation experience of the academic staff. Within the study program, cooperation of the academic staff members is organized so as to promote achievement of the learning outcomes. By reviewing and updating the study program, the members of academic staff mutually agree on the most appropriate and effective solutions for evaluation of student achievements and achievement of performance indicators. Periodically discussing and reviewing the curricula of the study courses, thematically coordinated and complementary acquisition of the study program is ensured, topic overlapping at different courses within one study program is prevented.

Cooperation of the members of academic staff occurs withing a certain study course, in collaboration with responsible academic staff, PhD students, industry professionals, and between the study courses with related themes, where acquisition of similar themes is necessary at different levels of awareness (general, detailed, methods of application, etc.). When planning the academic year and approving the tasks of the study course projects, the previously identified shortcomings are taken into account and corrections are made.

The ratio of the number of students and lecturers within the study program is 1 lecturer for 8 students in practical classes and 1 lecturer for 35 students in lectures.

Annexes

III - Description of the Study Programme - 3.1. Indicators Describing the Study Programme		
Sample of the diploma and its supplement to be issued for completing the study programme	RABA_dipl_EN.zip	RABA_dipl_LV.zip
For academic study programmes - Opinion of the Council of Higher Education in accordance with Section 55, Paragraph two of the Law on Higher Education Institutions (if applicable)	Nr_82_EN_RTU_Bak_Arhitekt_par+250+stud (1).pdf	P2_Nr_82_RTU_Bak_Arhitekt_par+250+stud.pdf
Compliance of the joint study programme with the provisions of the Law on Higher Education Institutions (table) (if applicable)		
Statistics on the students in the reporting period	Annex_5_Arch_RABA_Statistics_EN.pdf	5pielikums_Arh_RABA_Statistika_LV.pdf
III - Description of the Study Programme - 3.2. The Content of Studies and Implementation Thereof		
Compliance with the study programme with the State Education Standard	Annex_6_Arch_Bac_RABA_EN.pdf	6.pielikums_Arhitekti_Bak_RABA_LV.pdf
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard or the requirements for professional qualification (if applicable)		
Compliance of the study programme with the specific regulatory framework applicable to the relevant field (if applicable)		
Mapping of the study courses/ modules for the achievement of the learning outcomes of the study programme	RABA_Kartējums_2021EN.xlsx	RABA_Kartējums_2021X.xlsx
The curriculum of the study programme (for each type and form of the implementation of the study programme)	RABA_Planojums_EN.pdf	0_RABA_Planojums_2021x.pdf
Descriptions of the study courses/ modules	RABA_EN_courses.zip	RABA_lv_studiju_kursi.zip
Description of the organisation of the internship of the students (if applicable)		
III - Description of the Study Programme - 3.4. Teaching Staff		
Confirmation that the academic staff of the doctoral study programme includes not less than five doctors, of which at least three are experts approved by the Latvian Council of Science in the branch or sub-branch of science in which the study programme intends to award a scientific degree (if applicable)		
Confirmation that the academic staff of the academic study programme complies with the requirements specified in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions (if applicable)	Confirmation - on compliance of the academic staff.edoc	Apliecinājums - AL 55. pants par prof. skaitu akadēmiskās programmās.edoc

Innovative road and bridge engineering (45582)

Study field	*Architecture and Construction*
ProcedureStudyProgram.Name	*Innovative road and bridge engineering*
Education classification code	*45582*
Type of the study programme	*Academic master study programme*
Name of the study programme director	*Ainārs*
Surname of the study programme director	*Paeglītis*
E-mail of the study programme director	*ainars.paeglitis@rtu.lv*
Title of the study programme director	*profesors/ doktora*
Phone of the study programme director	
Goal of the study programme	*The general objective of the study programme is to provide a set of theoretical knowledge and practical skills to ensure that students attain the relevant competencies of a master's academic degree.* *The programme shall aim at preparing students for independent scientific research activity, providing academic education in order to prepare further doctoral studies, teaching activities of higher education or practical work in the field of transport infrastructure engineering.*
Tasks of the study programme	*General objectives of study program:* *- to ensure competitive Master's higher education according to international standards and to prepare students for practical work, to develop research skills, and encourage their use;* *- to provide students with comprehensive knowledge in the field of Transportation Engineering, make professional skills, and develop competencies following labor market requirements;* *- to promote interest in the further education and supplement of academic and professional knowledge;* *- to encourage students to interest in social processes, to stimulate students' development as a positive, modern, accountable, and whole capable personality who can act independently and make decisions independently;* *- to ensure development and changes of program content, study process, and scientific research according to the latest technologies and knowledge in the field of road and bridge engineering, international practice, science, and didactic practice;* *- to encourage staff and students interaction in scientific research and practical use of obtained results according to international standards and trends in the civil engineering industry;* *- to promote and develop an international exchange of academic staff and students and participation in projects.*

Results of the study programme	*Graduates of the Master Study Programme:* *- to be able to show a specific basic and specialized knowledge in the Civil Engineering science discipline and a critical understanding of this knowledge. A part of the knowledge conforms to the highest level of achievement in the field of Transport and Traffic Sciences.* *- can show the understanding of the most important concepts and relationships in the Civil Engineering science discipline.* *- to be able to carry out professional, innovative, or research work, formulate and describe the information, problems analytically, and solutions in the field of Civil Engineering science discipline, interpret and have a substantiate discussion about them based on the mastered theoretical knowledge and skills.* *- to be able to work on their professional development, show the knowledge of different scientific approaches by solving technical or scientific problems, take the responsibility and initiative by working individually, in a team or other people management, make decisions and come up with creative solutions in variable or uncertain situations.* *- to be able to obtain, select and analyze information independently and use it to make decisions and deal with problems, show that they are aware of the professional ethics, analyze the influence of their professional activities in the environment and society and participate in the development of the professional branch.*
Final examination upon the completion of the study programme	*The final Examination includes the defence of the Master Thesis.*

Study programme forms

Full time studies - 1 years, 6 months - english

Study type and form	*Full time studies*
Duration in full years	*1*
Duration in month	*6*
Language	*english*
Amount (CP)	*60*
Admission requirements (in English)	*professional bachelor degree in civil engineering or professional bachelor degree in transportation engineering, or comparable education*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*master of engineering in construction and civil 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

3.1. Indicators Describing the Study Programme

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

The **Academic Master Study Programme "Innovative Road and Bridge Engineering"**, education classification code 45582; licence No. 04051-16 issued by the Ministry of Education and Science of the Republic of Latvia on 27 February 2015; accredited: 29 May 2017–30 June 2022; Accreditation Licence No. 2020/39.

Profile:	Civil Engineering
Level of studies	Academic Master Studies
Course code	RBMI0
Duration of the study course	1.5 years full-time studies
Credit points	60 CP (90 ECTS)
Previous education	professional bachelor degree in civil engineering or professional bachelor degree in transportation engineering, or comparable education
Degree awarded	master of engineering in construction and civil engineering
Place of implementation of the study programme:	Riga Technical University, Riga, Latvia Vilnius Gediminas Technical University, Vilnius, Lithuania
Language of instruction:	English

The academic master study program **"**Innovative Road and Bridge Engineering" is implemented at Riga Technical University (RTU) and Vilnius Gediminas Technical University (VGTU) in accordance with the agreement concluded on 17 March 2014 on joint implementation of the aforementioned study programs. In accordance with this agreement, full-time studies in English are provided. The volume of the study program is 60 KP (90ECTS) and its implementation period is 3 semesters. In the first semester, classes are held at VGTU, in the second semester, at RTU, and in the third semester, when students develop their Master Thesis, studies take place at the university chosen by the student.

To supervise the study program, the Joint Study Program Council is established. It includes a

minimum of three representatives from each of the program implementing universities. The Council meetings have been held a minimum of once a semester.

Students are enrolled for the study program both at RTU and at VGTU in accordance with the Enrolment Regulations of each program implementing university.

During the reporting period from 2017 to 2021, no changes were made to the programme parameters. The academic master study programme “Innovative Road and Bridge Engineering” envisages a study period of 1.5 years. Upon completion of the study programme and public presentation of the Master Thesis, the student acquires the Master of Science Degree in construction and civil engineering.

The content and curriculum of the academic Master study programme “Innovative Road and Bridge Engineering” as well as its main aim are in line with the mission of RTU: to provide the Latvian economy and society with a competitive high-quality scientific research, higher education, technology transfer, and innovation.

Similar study programmes are not implemented in the Baltic States. Unlike other study programmes, the aim of this study programme is to ensure a competitive higher education at the graduate level in line with international standards and to educate and train students for practical work, develop their research skills and promote their use in Latvia, Lithuania and other countries in the world.

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

Academic Master study program “Innovative Road and Bridge Engineering” has been developed considering the current trends in higher professional education in Europe; it has been designed to be recognizable in Europe, to make sure students acquire both theoretical knowledge and practical skills to be competitive in the European labour market.

The aim of the study programme is to provide education and training to the students so that they acquire professional tertiary education in transportation engineering corresponding to Level 7 of the Latvian Qualification Framework. In the course of studies, students develop the knowledge necessary to start independent work in the professional capacity or to continue studies at the Doctoral study programmes.

The quality of learning outcomes to be achieved in the course of studies is ensured by the coordinated system of program prerequisites, study aims and tasks. The general principles of the system are defined by RTU Regulations of Studies www.rtu.lv/content/view/5257/1874/lang,lv/.

The implementation of the programme complies with the Education Development Guidelines 2021-2027 “Future Skills for the Future Society” https://www.izm.gov.lv/lv/izglitibas-attistibas-pamatnost- ādnes-2021-2027gadam” and in the course of its implementation, the highest qualification specialists in the field of transportation

engineering are educated and trained. The improvement of the Master study programme follows the requirements of the European Qualifications Framework, which complies with the Bologna process and other regulatory enactments.

The enrolment procedure to the Master studies is regulated by “Regulation on enrolment to undergraduate academic and professional study programmes” approved by RTU Senate (https://www.rtu.lv/lv/studijas/uznemsana/uznemsanas-noteikumi/uznemsanas-noteikumi-pamatstudijas) (in Latvian).

Aims of the study program:

- The general aim of the academic Master study program “Innovative Road and Bridge Engineering” is to provide the body of theoretical knowledge and practical skills to ensure that students develop competencies and skills meeting the requirements for an academic Master degree.
- The aim of the program is to provide students with the opportunity to gain theoretical and academic knowledge, develop academic, creative and research skills to be capable to work in the field of transpiration engineering, which would ensure that students develop the necessary skills to design and implement efficient new technologies and methodologies and that they successfully integrate in the local and international labour market, as well as continue professional advancement or continue studies at Doctoral study programs

Tasks:

- to provide students with theoretical knowledge, competencies and skills in the field of transportation engineering to promote the application of relevant knowledge and research skills to solve technical or scientific problems;

- to ensure development and improvement of the study program curriculum, study process, research activities accounting for the changes in international practice and research in the field of road transport infrastructure;

- to promote students’ interest in further professional advancement, development of their academic knowledge and motivate them to continue studies at Doctoral programs;

- to promote research activities by academic personnel and students and support the practical implementation of the research results, to promote their international mobility and participation in the projects;

- to ensure competitive Master's higher education according to international standards and to prepare students for practical work, to develop research skills and encourage their use;

- to provide students with comprehensive knowledge in the field of Transportation Engineering, develop professional skills and competencies in accordance with labour market requirements;

- to promote interest in further education and supplement academic and professional knowledge;

- to encourage students to be interest in social processes, to stimulate students' development as a positive, modern, accountable and fully capable personality who can act and make decisions independently;

- to ensure development and changes of program content, study process and scientific research according to the latest technologies and knowledge in the field of road and bridge engineering, international practice, science and didactic practice;

- to encourage staff and students interaction in scientific research and practical use of obtained results according to international standards and trends in the civil engineering industry;

- to promote and develop the international exchange of academic staff and students and participation in projects.

As a result of mastering the study programme, a graduate will be able (learning outcomes):

- to demonstrate in-depth or expanded knowledge and understanding of the latest discoveries in the field of construction and transportation engineering or transport construction which can provide a basis for creative thinking or research, including interactions between different fields;

- to independently use theory, methods and problem-solving skills, to conduct research work or perform high-quality professional activities;

- to effectively use arguments in discussions of complex or systemic aspects of the field of construction and transportation engineering or the field of transport construction with both specialists and non-specialists;

- to independently develop their competencies and specialisation, take responsibility for the performance of personnel and provide a respective analysis of their work, conduct entrepreneurship and innovation in the field of construction and transportation engineering or in the professional area, perform duties, conduct research or pursue further studies in difficult and unpredictable conditions and, if necessary, develop their skills using new approaches;

- to independently formulate and critically analyse complex scientific and professional problems, justify decisions and, if necessary, perform additional analysis;

- to integrate knowledge from different fields, contribute to the creation of new knowledge and to the development of research or professional methods; to show an understanding and ethical responsibility for scientific results or the potential impact of professional activities on the environment and society;

- to show an understanding of the most important concepts and regularities of the transportation and traffic sectors.

The aims, tasks and learning outcomes of the academic Master study programme are interlinked and their reachability is very high.

The study programme promotes the implementation of the leitmotif of Riga Technical University (RTU) as defined in its 2021-2025 Strategy: "*High quality and effectiveness – the 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 study systems built on research, innovation and cooperation with the industry. RTU educated and trains European and global-level engineers – leaders: developers of new technologies*."

(https://www.rtu.lv/writable/public_files/RTU_rtu_strategijas_2020._2025._gadam_21.12.2020_1_.pdf) (in Latvian).

The study programme fully complies with the development aim of RTU Faculty of Civil Engineering – to become an internationally recognized leading Latvian educational, research and development institution in the field of civil engineering, providing high-quality study process, internationally recognized research and sustainable innovation, commercialization and knowledge transfer for economic development.

Upon completion of the study programme, the graduate is granted the master degree of engineering in construction and civil engineering and each University (RTU and VGTU) issues its diploma and diploma attachments signed by the Rector of the corresponding University.

Programme code 45582 complies with Cabinet of Ministers Regulation No 322 Latvian Classification

of Education. The first and second levels of classification, represented by the first two digits of code 45, academic education (master's degree), to be implemented after the acquisition of a bachelor's or professional bachelor's degree. Duration of studies in full-time studies one to two years. The third, fourth and fifth levels of classification (thematic groups, subject areas and programme groups), denoted by the next three digits 582, are Civil Engineering (58 stands for Architecture and Civil Engineering).

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

The aim of the EU transport policy is to ensure high mobility for people and enterprises in the European Union, including Latvia. This means accessible and high-quality transport and transportation infrastructure solutions, free movement of people, goods, and services, improvement of social and economic unity, as well as the assurance of the competitiveness of the European economy. Transport flows in Europe are dominated by road transport. It serves all Europeans (even those who do not travel, for the food and other goods, are delivered via road transport). Road transport accounts for 83% of passenger transport in the EU and 46% of all freight transport. Society’s biggest and most long-term investments are aimed at the construction of transport infrastructure; therefore, high qualification specialists are necessary, who can design roads, bridges, other transport structures, manage construction projects, maintain these structures in working order, conduct scientific research, and develop new theories and methods of civil engineering.

Academic Master study program “Innovative Road and Bridge Engineering” has been developed considering the current trends in higher professional education in Europe; it has been designed to be recognizable in Europe, to make sure students acquire both theoretical knowledge and practical skills to be competitive in the European labour market.

Education in the field of Civil Engineering at Riga Technical University (RTU) is implemented by the Faculty of Civil Engineering (FCE). It is implemented at the state accredited study programs at the four consecutive levels of academic education and professional qualification development. The first and second levels (college programme and professional Bachelor studies) provide the education necessary to perform professional activities in the field, the third and fourth levels (Master and Doctoral) – to perform research and pedagogical activities. Each education level provides education, which corresponds to the respective employment opportunities in accordance with the requirements of the State Professional Standard.

Academic Master study program “Innovative Road and Bridge Engineering” consists of a set of lectures, practical classes and independent literature studies. Students obtain in-depth knowledge within technical and economic study courses relevant for the field of transportation engineering, as well as courses in humanities and social sciences.

In the process of its improvement, the changes in transportation engineering in Latvia and in the whole of Europe have been studied in recent years. The main emphasis has been placed on the introduction of new technologies to the study process, as well the training of the students to use construction information modelling which is included now in the study courses.

The study programme is being improved to make it appealing for young professionals. Research

and analysis are carried out considering other universities across different European regions in order to improve the study programme as comprehensively as possible. The study courses within the study programme are based on general trends in the construction industry – they are included in the study courses, also the general professional understanding of the study courses needed to be mastered by the professionals in the field is also covered. The study programme is modern and follows the latest trends outside Latvia, as well as it is specific enough in Latvia to claim that it has its own well-defined place in the family of other study programmes in the field of engineering sciences.

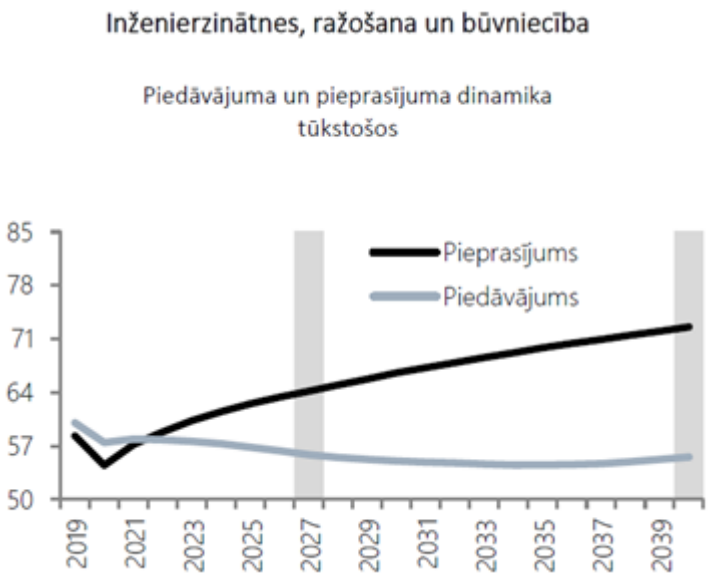
The academic staff of the programme regularly follow and update the study courses so that they are based on the achievements and acknowledgements of the respective field of science. Course descriptions will be approved by the Programme Director and the Head of Department prior to the start of each semester to keep abreast of academic staff workload and possible development. The teaching staff also update the content of study courses in accordance with the trends of scientific development, using information available in the databases of scientific articles - EBSCO, Emerald, Scopus, Web of Science, etc. Academic personnel are motivated to publish the results of their research, especially in the scientific databases SCOPUS and Web of Science, with royalty for each article published in these databases. The results of the academic staff development are evaluated each year during the annual appraisal and the results are used to plan further professional advancement of each member of the academic staff.

The National Road Construction Programme for 2014-2023, approved at the Cabinet of Ministers, includes projects for capital investments of 1486.8 million EUR. This allows for a positive forecast on graduates' employment prospects.

On 1 January 2021, 73,073,749 km of roads and streets were registered in Latvia. The average density of the road network is 1,132 km per km2. The total length of national roads is 20,177,686 km. The average density of the national road network is 0.312 km per km2. Over the last five years, the share of road sections in poor condition in the national road network increased by 10% on average. The overall quality of roads continues to deteriorate. At present, 55% of the state roads have not been repaired in the required time. With the current insufficient level of financing for road maintenance and development, with the increase of traffic intensity and the share of heavy vehicles, there is constant road network deterioration and an irrational growth of expenditure for road users, as well as an increase in the number of traffic accidents. In 2019, 30.48% or 2,805.99 km of roads with black pavement were classified as deteriorated and required rebuilding of the pavement (in 2015 – 25%, in 2016 – 24%, in 2017 – 24.3%). In 2019, 42% or 4,681 km of state roads with gravel cover were classified as deteriorated. They need to be rebuilt.

The budget allocated for the improvement of roads and bridges in poor technical condition and for the design and construction of new transport structures allows looking positively at the future development of the industry and forecasting an increase in the demand for new transportation engineers over the next six years.

The Informative Report on Medium and Long-term Labour Market Forecasts for 2020 of the Ministry of Economics indicates that in 2030 the demand for labour will exceed the level of 2019 by 4.7% and will make up one-fifth of the total number of employees in the economy. This in turn will boost the employers' interest in recruiting new employees with knowledge in digital technologies, computer science, as well as people with analytical thinking skills. The demand for workforce will grow in only three sectors – commercial services, construction and manufacturing, see Figure 2.1.1.



Fig, 2.1.1. Supply and demand development dynamics (emzino_03062020-with-annexes1)

This means that our trained specialists with higher education will be in high demand in the labour market.

Furthermore, the study programme is improved after evaluation of the final examinations, as representatives of employers regularly take part in the work of Graduate Paper Examination Committees to assess the knowledge acquired by students within the study programme. Participating in the work of the Graduate Paper Examination Committees representatives from the industry can express their suggestions concerning the desired topics for student research in demand in the labour market. These recommendations are taken into account while improving the courses of the study programme for the next academic year.

When analysing the employment of graduates, it should be noted that they are mainly employed in private companies, municipal development departments and construction boards, design companies, public administrations and other sector-related organisations. These include SC ACB, SC Binders, SC Latvijas tilti etc.. Many students find a job during their internship, and around 90% continue to work in their internship after graduation. When conducting a survey of students at the defence of a master's thesis, 98% of students have found jobs in speciality and are already working. A considerable lack of engineer personnel characterises the transport infrastructure engineering sector in Latvia.

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

The number of enrolled students during the reporting period is shown in Figure 1.2.1.

The fluctuations in the number of students are due to the following:

- insufficient advertising of the programme abroad;
- uncertainty with receiving a student permit in the three Baltic countries.

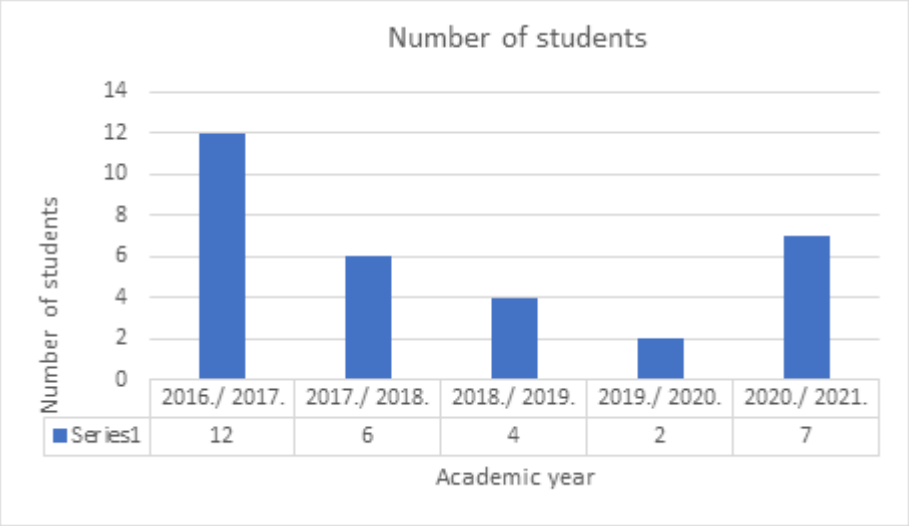


Fig. 1.2.1. The number of students in the reporting period

Distribution of graduates by the academic year in the reporting period is shown in Figure 1.2.2.

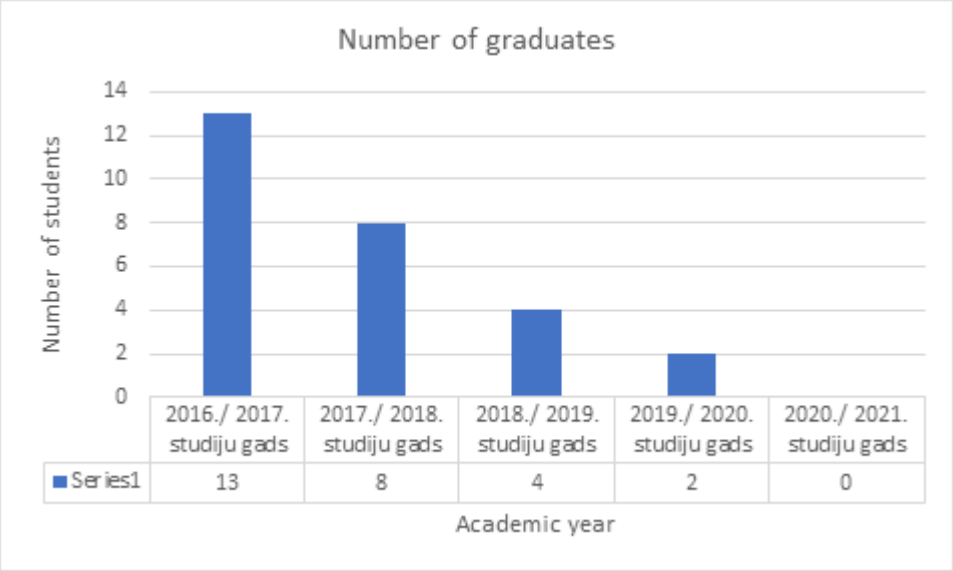


Fig. 1.2.2. Number of graduates in the reporting period.

During the reporting period, 27 Master Theses were publicly presented, and 27 students received a Master Degree in Transportation Engineering. The students from Latvia, Lithuania, Egypt, Nepal, Spain and Ukraine have been enrolled or completed the study programme.

Figure 1.2.3 shows the fluctuations in the number of students enrolled in the academic Master study program in the recent study years.

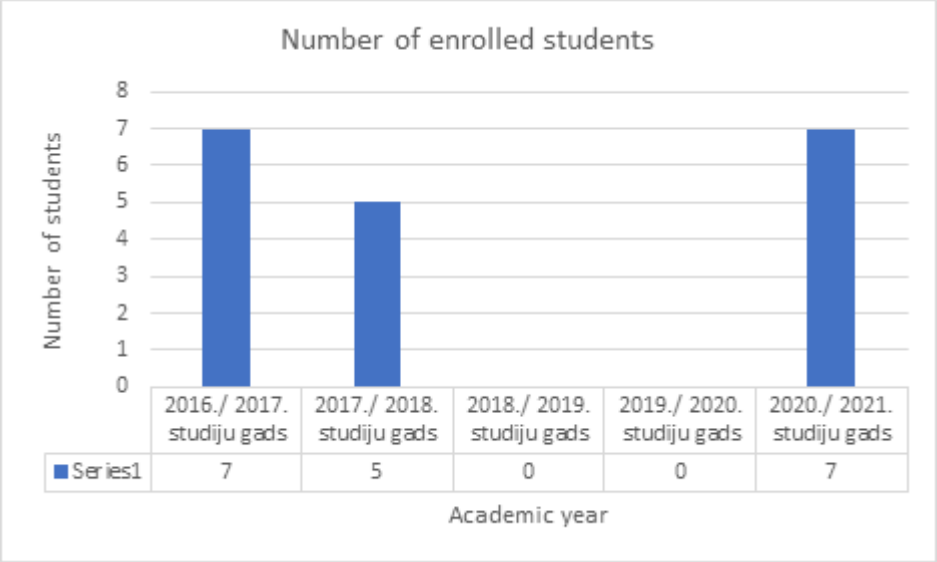


Fig.1.2.3. The number of enrolled students in the reporting period.

The costs of Master studies for the students from Latvia and Lithuania are covered by the state budget. Foreign students are required to pay tuition fee, their number has demonstrated growth trends. English is the main language of instruction at the academic Master study programme.

The data over the reporting period allow concluding that the drop-out rate among students is not high. On average, it does not exceed 1% of the overall number (2 students were exmatriculated).

The main reasons for dropping out are the following: 1) inability to complete the study courses; 2) personal or family circumstances.

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

The need for the developed Innovative road and bridge engineering study programme shall be targeted to the education of modern road and bridge engineering specialists, demand for the said specialists and their employment potential.

Need for the Innovative road and bridge engineering study programme specialists is based on the outcome of a variety of reports and investigations. One of the key indices pointing to the justification of the need for the Innovative road and bridge engineering programme is one of the best employment rates of RTU and VGTU graduates (structural engineers in particular) on the market during the last few years. Around 80 % of RRTU and VGTU graduates found jobs suited to their speciality and it is the best index among all universities in Latvia and Lithuania. It is worthwhile mentioning, that the sector of civil construction is vulnerable to economic changes in these countries. Despite economic turbulence during COVID, demand for skilled specialists has remained subdued.

This study programme provides students with the knowledge and skills to address today's particular problems of sustainable car roads and civil engineering structures (including bridges) in the design, construction and operation of roads and civil engineering structures (including bridges). This requires the use of the latest knowledge of innovation and research in this field of engineering, the

ability to construct optimal road paving structures, carry out and analyse complex road and bridge studies, to be able to design bridges by automated means, to choose the optimal option, to know special materials and structures, and to be able to apply them in road and bridge design solutions. The need for an Innovative Road and Bridge Engineering study programme is also highlighted by the social partners the cooperation agreements have been signed with (around 20 social partners) for outsourcing research, for identifying the topics for the final theses, participation in the commission for the defence of the final theses, etc. Students have the opportunity to join the teams/groups of scientists and work in projects carried out by the Road Department, the Road Research Institute, the Institute of Research on Building Structures and the Institute of Transport Infrastructure Engineering (Riga Technical University)

The aim of the Master's degree programme of Innovative Road and Bridge Engineering is to prepare masters in construction engineering capable of understanding, studying, analysing and solving the design, construction and maintenance problems of modern roads and bridges, effectively, in an integrated and complex manner, applying advanced road management theories acquired by VGTU and RTU in companies of Lithuania, Latvia or other foreign countries, as well as innovative knowledge of road and bridge engineering science and practice in the formulation and evaluation of road maintenance and development solutions based on scientific reasoning, systematic, critical and constructive thinking. The aim of the Innovative Road and Bridge Engineering Master's degree programme is to educate students in the way that holding the Master's degree in engineering sciences they will be able the following: effectively apply the acquired knowledge in construction engineering research and training while formulating and evaluating the road maintenance and development solutions; make reliable personal decisions based on systematic, critical and constructive thinking, scientific reasoning; in an integrated and complex manner apply the advanced engineering knowledge of road management theory, innovative road and bridge design and technology engineering, construction, economics, other scientific and technology-based innovations.

VGTU is well known for its high level of scientific achievements. In the field of transport engineering very active is Road Department, which was founded at the Lithuanian University (LU) in 1922 and the first Road engineers in Lithuania graduated from Kaunas State University (KVU) in 1949. Later the Road Department has passed through different faculties of KPI, KPI VF, VISI, VTU and VGTU educational institutions. Within the period from 1949 to 2011, a number of graduate engineers make 1592, of which 1519 are road engineers and another 73 are railway engineers. Thus far, the specialists required for the road branch are educated by the Road Department of Environmental Engineering Faculty at VGTU, where the first and the second cycle road and railway engineering specialists are trained. Bridge and Special Structures Department of Civil Engineering Faculty of VGTU is the sole department in Lithuania to educate the first and second cycle specialists for building engineering of road and special structure bridges and overpasses. The choice of partner universities was determined by their achievements in scientific aspects of civil engineering.

More than 10 dissertations were defended in the Environmental Engineering Faculty and Civil Engineering Faculty of VGTU during the recent six years. The main topics tackled by the doctoral dissertations include researches of road pavement structures (operational properties of pavements, deformations, use of geotextile for pavement structure, influence of heavy-duty vehicles and climate conditions on the pavement structure, recovery/reuse of asphalt); researches seeking to improve road design; modelling of solving traffic safety problems; analyses of the influence of road construction materials (asphalt mixtures, bitumen) on the pavement.

Mathematical modelling, experiment planning and fundamental laws of physics and chemistry are widely employed for processing of results of scientific research experiments dealt with in dissertations developed in the Road Department. Topics to be chosen for doctoral dissertations at the Road Department are fully independent/free and interconnections with construction/building material sciences can be found.

Scientific works of Civil Engineering Faculty are based on digital modelling, development of material models, experimental analyses of reinforced and steel structures, natural bridge tests, data analysis statistical methods and analysis of dynamic behaviour of bridges.

The RTU and VGTU agreement sets out the following arrangements for the implementation of the programme: the 1 st semester of the studies takes place in VGTU, and the second semester - in RTU. In the third semester, students can choose one of the universities in which to perform research work and to develop a master thesis.

Having regard to the above the VGTU is an outstanding partner university to successfully implement the Joint Masters Program.

3.2. The Content of Studies and Implementation Thereof

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

The content of the academic Master study programme “Innovative Road and Bridge Engineering” complies with the regulatory enactments of the Republic of Latvia, RTU internal regulations, Development Strategy of RTU and that of the Faculty of Civil Engineering, as well as contributes to the achievement of the United Nations Sustainable Development Goals (SDGs).

The Master study program envisages the acquisition of general education courses, professional specialization courses, humanities and social science courses as well as second foreign language courses in the relevant specialisation area. Elective study courses are also available.

Within the study programme, themes of theoretical papers and practical tasks are regularly related to current trends in the industry. Research and creative work results are regularly reflected in scientific journals and conference materials. The Faculty of Civil Engineering regularly publishes the Baltic Journal of Road and Bridge Engineering https://bjrbe-journals.rtu.lv/, which is included in the SCOPUS and WEB of Science databases. Every year, the academic staff of the Faculty of Civil Engineering publishes dozens of articles in various local and international scientific journals and presents more than 20 papers at local and international scientific conferences. The variety in topics showcases a broad range of interests among staff members, which ensures informativeness and creative diversity in the study process.

The information contained in the study courses stems from the aim of the study course and the learning outcomes, which in turn derive from the aim of the study programme and the learning outcomes. The linkage is well visible from the study programme mapping (Annex 8).

The academic Master study programme shall provide for compulsory study courses corresponding to the specialisation: “Scientific Research and Innovations”; “Innovative Pavement Structure Design”; “Nonlinear Analysis of Reinforced Concrete Bridges”; “Dimensional Road Design”; “Risk and Safety in Bridge Engineering”; “Innovative Timber and Reinforced Concrete Bridges”; “Durability of Bridge Structures”; compulsory elective study courses: “Road Integrated Research”; “Traffic Safety Management”; “Steel-Concrete Composite Bridge”; “Computer-Aided Design of Bridges”; “Composite Materials for Bridges”; “Road Network Planning”; “Land Use Planning”; “Pedagogy” and “Psychology”; and the development of the Master Thesis. The structure of the programme is given in Table 2.2.1., description of the programme is available at: https://stud.rtu.lv/rtu/vaaApp/sprpub (in Latvian).

Table 2.2.1. The structure of the Master study programme

Part	Content	Credit points	Volume %
Part A	Compulsory study courses	26 CP	43%
Part B	Compulsory elective courses:	14 CP	23%
	- Professional specialisation courses	12 CP	20%
	- Pedagogy and Psychology study courses	2 CP	3%
Part E	Final examination (Master Thesis)	20 CP	34%
	TOTAL	60 CP	100%

This allows realistically assuming that having obtained a Master degree, the graduates are able to solve current tasks in the field of transportation engineering and that their knowledge complies with the “graduate” study level set by the Bologna Declaration.

2014 Cabinet Regulations No 512 the state academic education standard, the volume of a Master study programme shall be at least 40 CP and the volume of the Master Thesis - at least 20 CP. The compulsory part of the programme except for the Master Thesis shall include ensuring the study courses dedicated to the study and acquisition of the latest achievements in the theory in the respective field and approbation of these theories in practice shall amount to at least 24 CP. This programme does not include free-choice items (Part C) but has compulsory elective courses of 14 KP.

The requirements for admission require students with a degree of professional bachelor in civil

engineering or professional bachelor's degree in transportation engineering, or equivalent education, who have acquired civil and environmental protection courses in a lower-level study programme, therefore these courses are not included in the programme.

These requirements are met within the academic Master study programme: the volume of the programme is 60 CP, compulsory elective study courses amount to 26 CP.

Each study course has a defined aim and learning outcomes to be achieved. All knowledge, skills and competencies in the study course are related and subordinated to the aims and expected learning outcomes of the study programme. The plan of the study programme is given in Annex 9, the descriptions of the study courses – in Annex 10. Each study course provides acquisition of 1 through 5 programme outcomes. Each programme outcome corresponds to at least 1 study course, but on average there are 3 or more courses.

Prior to the start of an academic term, each member of the academic staff has to examine the course description, assess the existing aims of the course and the expected learning outcomes, and has to examine the learning materials and literature, make sure that the literature is up-to-date and includes the advanced research in the field.

To provide the cross-complementarity of the study courses, as well as to avoid duplication, the academic staff discusses regularly the structure of the study programme. The descriptions of the study courses are available on ORTUS platform, so the academic staff has access to descriptions of other study courses which ensures their interconnection.

The reconstruction of the building of the Faculty of Civil Engineering Period has been done from 2019 until 2021, which resulted in a modern building and new laboratory premises.

The renewal of the content of the study course is ongoing, as academic staff associated with the programme regularly raises their qualifications by participating in international scientific conferences and congresses, participating in the development of real road and bridge design projects, participating in the implementation of cross-national scientific research projects. The acquired new knowledge and findings are used for the renewal of study courses.

The RTU and VGTU agreement provides that the study process takes place in both partner universities: the 1 st semester of the studies takes place in VGTU, and the second semester in RTU. In the third semester, students can choose one of the universities in which to perform research work and to develop a master thesis. As the majority of students are from Latvia and Lithuania, Lithuanian students are not in Latvia for more than 6 months, so learning Latvian is not included in this programme.

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

The content of the academic Master study programme “Innovative Road and Bridge Engineering” is based on the content and achievements of the scientific discipline of Civil engineering and transport engineering, sub-discipline the surface transport infrastructure.

The academic Master study programme “Innovative Road and Bridge Engineering” defines the

following scientific research directions:

Field of research	(%)
Research of road construction materials	20
Research of asphalt concrete for road pavement	30
Estimation of the lifetime of bridge structures	10
Methods for evaluation and modelling of the bridge damages	10
Studies of geotechnical conditions of construction	10
Road safety studies	10

The themes of theoretical works and practical tasks of the study programme are regularly related to advances in the industry. Research and creative work results are regularly published in scientific journals and conference proceedings. FCE regularly publishes the journal "The Baltic Journal of Road and Bridge Engineering" https://bjrbe-journals.rtu.lv/ , which is included in SCOPUS and WEB of Science databases. Annually, the academic staff of FCE publish several dozens of articles in various national and international scientific periodicals and take part in local and international scientific conferences with more than 20 reports. Thematic diversity illustrates a broad spectrum of individual interests that offer the diversity of information and creative work in academic work.

Students in the academic Master study programme "Innovative Road and Bridge Engineering" have an opportunity to specialise in one of these research fields:

- Construction materials of road pavement.
- Sustainable bridge management systems.
- Smart, multipurpose composite materials and structures.
- Road and bridge design.
- Geo-technical studies of road and bridge foundations.
- Road safety studies

For example, the members of the academic staff work in the following fields of research:

Road, bridge and road traffic research – Professor, Dr.sc.ing. Juris Smirnovs, Professor, Dr.sc.ing. Ainārs Paeglītis, Professor, Dr.sc.ing. Atis Zariņš, Assistant Professor Dr.sc.ing. Viktors Haritonovs. A detailed description of the research fields:

- Road traffic safety, including research on traffic safety in cities, optimal traffic organization schemes, methods to eliminate "dark spots" (Prof. J. Smirnovs);

- Road asphalt concrete coating research, including research on the durability of bitumen coating, development of new asphalt-concrete compositions using new innovative materials (lead.res. V. Haritonovs);

Optimization of spatial road design parameters (prof. A. Zariņš).

Many publications during the reporting period could be considered one of the most significant high-quality scientific research indicators of the academic Master study programme "Innovative Road and Bridge Engineering". For example, in 2015-2021, a total of 183 articles by the academic staff

working at the professional Master study programme “Innovative Road and Bridge Engineering” have been published in the journals indexed in SCOPUS database, of which 57.9% are published in Open Access journals. The themes of publications by area are given in the figure below.

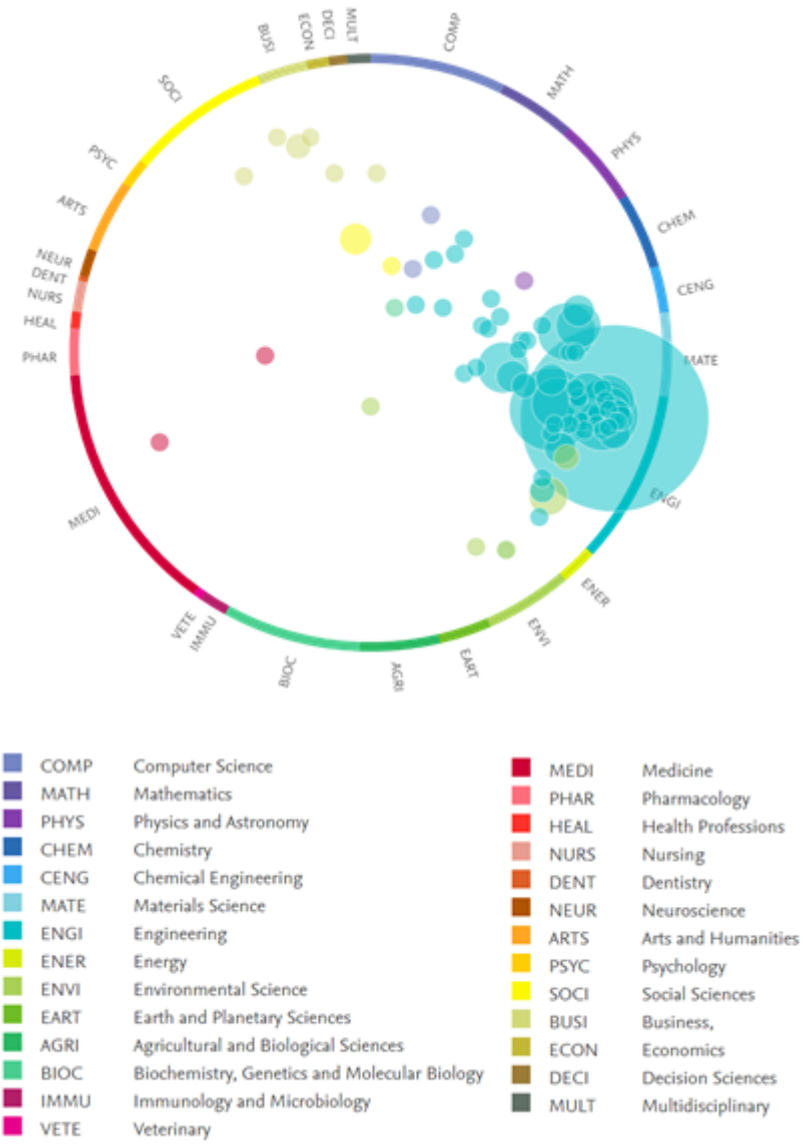


Figure 2.2.1. The input of SCOPUS indexed publications by the academic staff working at the academic Master study programme “Innovative Road and Bridge Engineering” (in 2015-2021; the data for 2021 are incomplete) to the development of thematic areas (SciVal data).

It can be concluded that the allocation of master's degrees is based on the achievements and lessons of the undertaking of the scientific discipline of Civil engineering and transport engineering, sub-discipline the surface transport infrastructure.

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

Academic Master Study Programme “Innovative Road and Bridge Engineering” has been developed so as to ensure the successful development of knowledge, competencies and skills on the basis of individual and group work, as well as continuous communication between the student and the instructor.

The study courses are evaluated in accordance with the RTU Senate Decision of 29 March 2010 "On the Regulations for Evaluation of Learning Outcomes", the RTU Senate Decision of 25 May 2001 "On the Criteria for Evaluation of Learning Outcomes " and the RTU Senate Decision of 29 January 2001 "On the Transition to a Unified Evaluation of Study Results" in a 10-point system (10 - excellent, 1 - very, very poor). The examinations consist of tests, study papers and exams according to the study plans approved for each semester.

Learning outcomes for each study course are defined separately, they are included in the Study Course Description that is published in the RTU Study Course Catalogue. Each instructor within their study course tests the knowledge, skills and competencies of the students specified in the course description (papers, tests, presentations, independent works, case study analyses, group works, etc.). The final grade is the sum of all test papers and examination grades, the percentages of which are also indicated in each course description and presented to students at the beginning of the semester.

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 the semester. Criteria for assessment of the study courses and individual/home tasks are published in ORTUS portal beforehand. During the semester, the assessment for each home task, test, report, presentation and any other task is ascribed a 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 by 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 program and learning outcomes are taken into consideration.

Student-cantered teaching and learning principles are observed within the Academic Master Study Programme “Innovative Road and Bridge Engineering”. The approaches used during studies promote the achievement of the aims and learning outcomes of the study courses and programme. Students have an opportunity to influence their study process, remain autonomous, submit feedback on the study process, aligning it with their expectations. It must be noted that learning and training guidelines are defined in the RTU Code of Academic Integrity, Regulation on the Assessment of Learning Outcomes, the methodological guidelines for the development of the study papers and the thesis, etc.

Examinations set by the program allow making sound conclusions about the level of knowledge and skills of each student assessing their progress in the long term. In order to improve student academic performance and raise their interest in acquiring comprehensive knowledge, FIC runs an annual competition among the students for the opportunity to continue studies on the state budget funds. The only criterion that is taken into consideration is the student’s academic performance in the previous period.

Implementation of the study programme is carried out using different modes of the study course implementation. Students work in small groups, but at senior courses - through individual work, which allows applying appropriate and diversified pedagogical approaches. The study process is

organized in a way to encourage the autonomy of students, simultaneously providing support to the member of the academic staff in their capacity of scientific supervisor a mentor.

RTU has an established quality assurance system. The quality of a study programme is assessed by study programme administration, departments that implement it and other involved units, Field Study Programme Committee of the faculty, Faculty Council and RTU Senate, as well as student self-government of the faculty.

Successful performance of the internal education quality assurance system at RTU is ensured at the following levels:

At the **level of the Office of Vice-Rector for Academic Affairs**, internal education quality assurance is performed by the Study Department, which:

- provides operations and control of RTU Study Course (SC) Register, monitoring whether the study course corresponds to the requirements of the respective tertiary education program and its content;
- surveys students at the university level to discover how successfully first-year students have adapted to the university system, to find out the level of student satisfaction with the study process, lectures, practical classes and academic staff, as well as ensures that survey results are available to RTU Study Department, each member of academic staff, heads of departments, Deputy Dean for Studies and a responsible person at the Office of Vice-Rector for Academic Affairs;
- ensures relevant premises and technical support to general lectures (100 – 200 seats).

At the **level of RTU faculties**:

- once a year, the head of the study programme submits a report to the Council of the faculty, prior to that assessing and ensuring the relevance of the study program at the Faculty Study Field Commission;
- student self-government is involved in the overall quality assurance process of the study program. Representatives of the student self-government actively participate in the work of decision-making bodies: RTU Academic Assembly, RTU Senate, RTU Senate Commissions and Faculty Council.

At the **department level**:

- each semester the administration of the study programme analyses the results of the student survey on the quality of academic staff performance and overall assessment of the study program. The results are discussed at the department meetings, meetings of the Faculty Study Field Commission and Faculty Council meetings;
- once per academic year annotations to the study course within the study program, course syllabi, methodological resources, the list of literature and the guidelines for the development of the course works (reports, papers, internship reports and graduate papers) are reviewed;
- courses and seminars for faculty members are regularly organized to address such issues as the newest teaching and pedagogical methods. Members of academic personnel are motivated to attend qualification advancement courses;
- academic personnel and administration of the study program participate in various experience exchange activities, cooperating with universities from other countries, meeting representatives of the industry and entrepreneurs, discussing topical industry issues and student research work and projects;

- departments continuously monitor that the quality of the premises and equipment meets quality requirements and update the resources as necessary.

Additional quality assurance system accounting for the specifics of the study field is implemented **within the study programme**:

- regular monitoring of student individual performance (responsible authority – academic staff);
- regular reporting of performance results in the RTU Study Management System (responsible authority – faculty record management department);
- regular monitoring of the study program implementation process (responsible authority – program administration);
- regular discussion with the student self-government and program administration on the detected drawbacks and risks related to the study process (responsible authority – student self-government);
- regular updating individual courses and themes accounting for the newest discoveries and trends in the research field (responsible authority – Faculty Study Program Council);
- arbitration mechanism (responsible authority – program administration).

Learning outcomes for each study course are defined separately and are included in the study course description, which is published in RTU Study Course Catalogue.

Examination and credit test questions are prepared by the instructor responsible for the study course based on the approved description of the study course and the study program. Examination questions are formulated to ensure that a student is capable of comprehensively answering them thus demonstrating that they have fully covered course content. Tests are carried out in accordance with the requirements stipulated in effective RTU regulations.

Examinations set by the program allow making sound conclusions about the level of knowledge and skills of each student assessing their progress in the long term. In order to improve student academic performance and raise their interest in acquiring comprehensive knowledge, FIC runs an annual competition among the students for the opportunity to continue studies on the state budget funds. The only criterion that is taken into consideration is the student’s academic performance in the previous period.

Assessment of student advancement and their performance is conducted through the entire period of program implementation. At the seminar’s students submit their works to the instructor and develop their presentation skills and competencies. Tests envisioned by the program allow making sound conclusions about the level of knowledge and skills of each student assessing their progress in the long term. Presentations of course papers are public and are aimed at developing students’ discussion skills.

To ensure the functioning of the “Innovative Road and Bridge Engineering” academic programme, the partners' universities have established a council consisting of three representatives of each universality academic staff involved in the implementation of the master’s programme. The Council shall be convened twice in the study year and shall examine the relevant topics: the quality of studies, matters regarding the teaching staff who will be involved in the implementation of the programme, as well take decisions on the renewal of study courses and on the modernisation of the programme.

3.2.4. If the study programme envisages an internship, describe the internship opportunities offered to students, provision and work organization, including whether the higher education institution/ college helps students to find an internship place. If the

study programme is implemented in a foreign language, provide information on how internship opportunities are provided in a foreign language, including for foreign students. To provide analysis and evaluation of the connection of the tasks set for students during the internship included in the study programme with the learning outcomes of the study programme (if applicable).

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

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

The Academic Master Study Programme “Innovative Road and Bridge Engineering” includes a final examination – a Master Thesis in the volume of 20 CP. The Master Thesis intends conducting scientific research in the field of transportation engineering.

A Master student should demonstrate abilities and research skills in line with the Regulations on the State Academic Education Standard (Cabinet Regulations No. 240 as of 13 May 2014).

The theme of the Master Thesis shall be coordinated with the scientific adviser of the Master Thesis and the Head of the department. Students choose the theme of the Master Thesis either from the list of themes proposed by the department or address the challenges facing the industry or business. The scientific adviser of the Master Thesis may be an academic staff member of the department or a senior researcher holding a degree of Doctor of Engineering Sciences.

A student and their scientific adviser also agree upon the calendar plan. The theme of the Master Thesis is chosen during the 1st semester, and by the end of the semester a literature review of the theme under consideration must be compiled. At the end of the 2nd semester, the work performed so far is evaluated and assessed with a grade. At the end of the 3rd semester, the Master Thesis must be submitted to the State Examination Committee for public presentation. Student must receive scientific adviser’s approval for the viva voce examination. In case the student has not completed all the requirements imposed by the scientific adviser, or in case of excessive plagiarism (> 30%), the viva voce examination is not allowed.

Before the Viva Voce, the paper is reviewed by reviewers approved by the order of the heads of the respective departments of both RTU and VGTU. The Viva Voce Examination is public, it is evaluated by the State Final Examination Committee approved by RTU and VGTU Rectors, which includes the leading professors and leading researchers in the field. Viva Voce examination is held interchangeably at RTU and VGTU. Examples of the themes of recent Master Theses:

- Load effect of timber lorries on the bearing capacity of reinforced concrete bridges.
- Laboratory modification and investigation of SBS modified bitumen characteristics.

- Mechanical and Physical Performance of Asphalt Colored by Chemical Additives.
- Deformation Analysis of Concrete Beams Reinforced with Steel Bars and Fibres.
- Strengthening Efficiency Analysis of In-Service Reinforced Concrete Bridge Decks.
- Analysis of Design Regulation for Low Volume Roads and Recommendations for Lithuanian State Road Network Development.
- Roads Functional Analysis and Recommendations for Classification of Lithuanian State Road Network.
- Serviceability Analysis of Reinforced Lightweight Concrete Elements.
- Condition assessment of existing roadway bridges in Lithuania and Ukraine.
- Analysis of Innovative semi-self-anchored suspension steel Bridge behaviour.
- Cracking analysis of mass concrete bridge structures.

All Master Theses are available at https://ndr.rtu.lv/lv/ (in Latvian).

Analysing the wide range of topics, it can be concluded that both teaching staff and students demonstrate their skills, knowledge and competences at a very high level and in line with the topicality of the field. The choice of topics is based on the student's interest in current developments in the field and on the student's preferences for future career choices, and the final thesis topics owe to the sustainability and development of the programme as a whole.

Final grades for the Master Theses vary on average from a grade of 8 to a grade of 10 in the reporting period. The final grades come from a reviewer’s assessment, which accounts for 50% and from the decision of the State Examination Commission, representing 50% of the grade.

3.3. Resources and Provision of the Study Programme

3.3.1. Assessment of the compliance of the resources and provision (study provision, scientific support (if applicable), informative provision (including libraries), material and technical provision, and financial provision) with the conditions for the implementation of the study programme and the learning outcomes to be achieved by providing the respective examples.

RTU Faculty of Civil Engineering (FCE) continuously monitors compliance to quality requirements of rooms and technical equipment, the appropriate lecture halls with necessary multimedia hardware have been equipped. In order to ensure the qualitative study process, FCE is carrying out extensive refurbishment works, upon their completion, the Faculty will meet international standards for campuses and lecture halls. The classification of the premises is given in the table below.

Room type	Number of rooms	Useful area m²
Meeting room	1	70.91
Computer rooms	4	243.77
Auditoriums	23	1702.34

Teachers' rooms, cabinets	69	1523.61
Assistant professor / Doctoral student premises	5	196.24
Workspace/workshop	6	172.19
Research facilities	6	350.53
Laboratories	35	1256.83
Resource room	6	213.53
Auxiliary room	11	197.99
Anteroom	3	35.89
Student self-government and record-keeping	3	260.43
Kitchen	1	16.43
Total		**6240.69**

FCE institutes provide education and learning support: develop and update descriptions of the study courses, implement the corresponding study courses (including practical and laboratory works and seminars), supervision and defence of the graduate papers, and other activities related to learning, teaching and research work.

In 2017 – 2020, substantial investments were made in the research infrastructure. For example, the Institute of Transport Engineering had acquired such equipment as a Hamburg testing device (automatic Hamburg two-wheel tracker), as well as a roller-compactor, a four-point fatigue testing machine (four-point beam bending machine), a drone with an infrared camera for open-air drone-based measurements and reading, as well as a high-resolution camera for additional imaging. In 2021, the Institute of Materials and Structures in cooperation with the largest manufacturer of construction materials in Latvia – “Sakret” Ltd., established a new laboratory – 3D concrete printing laboratory equipped with a 3m x 3m concrete 3D printer. In 2020, FCE founded the Centre for Digital Building Technologies that carry out active research and training in Building Information Modelling (BIM).

The Scientific Library of RTU (https://www.rtu.lv/en/studies/scientific-library) is an academic library of state significance, which has obtained its status as a result of library accreditation. The Scientific Library of RTU provides the necessary information for RTU study process and research activities, performs library, bibliographic and information services for RTU students, teaching staff, and employees. The Library's collection includes 1.4 million printed documents and e-resources in the databases relevant to RTU fields.

In 2016, significant investment was made in the development of the library infrastructure, with the construction of an additional 2240 m2 of space for the Central Library. The total area of the library premises is 6393 m2, of which 3417 m2 are for reader services. There are 713 workstations for

library users. The library has four group rooms and six individual cubicles, a Western reading room and a conference room. The library is accessible to users with reduced mobility.

To improve the work of the Scientific Library of RTU and to ensure the availability of information needed for study and research work, the Library Council has been established, which decides on the replenishment of the library's collection with printed publications and subscriptions to the necessary databases. The Library Council has approved the "RTU SL Collection Completion Policy", which defines the basic principles of collection formation and development in accordance with the directions of RTU study and scientific activities.

When RTU provides funding for the library, the funding for information resources for each study programme is calculated. The collection is replenished according to the recommendations of the heads of the study programme, researchers, and the allocated funding. The desired titles can be ordered by contacting the Library's Collection Development Department, ordering on the Library's website, filling in the order form, filling in the application form, by phone or by visiting the Library. The Scientific Library offers a guide to ordering titles and e-resources, which brings together the websites of various publishers and bookshops in Latvia and abroad.

Database subscription contracts are concluded both directly with the supplier and through the "Cultural Information Systems Centre" state agency, which is the Latvian national representative of the international non-profit organisation EIFL (Electronic Information for Libraries, http://www.eifl.net/). The EIFL Licensing Programme offers national libraries subscriptions to internationally recognised databases at significantly reduced subscription fees not offered to individual subscribers, thus saving financial resources of the libraries.

The database subscriptions maintained by RTU Scientific Library

(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.

- Databases financed by the Ministry of Education and Science available to RTU Scientific Library: ScienceDirect, SCOPUS (Elsevier), Web of Science.

- Latvian databases: LETA, Letonika, the Database of Latvian Standards (available on the premises of the Library).

Database usage at the Scientific Library of RTU has been growing since 2016. E-resource loans have increased from 75,391 to 525,194 items.

The new library premises have allowed extending the range of services. Since the opening of the new premises in 2018, the number of visits to the library has increased from 103,825 to 235,600. The Scientific Library of RTU is open to everyone. The Central Library is open to users from Monday to Saturday. There is a 24/7 reading room. During the summer period, the Central Library is open every weekday with reduced opening hours. (https://www.rtu.lv/lv/studijas/biblioteka/pakalpojumi-3) (in Latvian).

The library's sources are housed in an open-access collection. Books and periodicals according to the field of study and the UDC indexes are located in the central building of the Scientific Library, 5 Paula Valdena Street, Riga. The last copies of the oldest publications corresponding to the RTU profile are kept in the library repository. They are always available to the users.

The librarian on duty helps visitors find their way around the collection. Bibliographers (information

specialists) provide more detailed information and advice. The library has a branch librarian service (https://www.rtu.lv/lv/studijas/biblioteka/nozaru-informacija).

The library resource search is supported by the Primo Discovery search tool (https://www.rtu.lv/lv/studijas/biblioteka/vienota-informacijas-meklesana) (in Latvian). It allows searching the library catalogue (https://kopkatalogs.lv/F/?func=find-b-0&local_base=rtu01) (in Latvian), the subscribed databases, as well as databases created by the RTU Scientific Library (https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/bibliotekas-veidotas-datubazes) in one interface. Searching for information in the electronic joint catalogue (https://kopkatalogs.lv/F), it is possible to simultaneously obtain information on the resources available in 12 Latvian libraries. Both the electronic catalogue and the RTU portal ORTUS allow remote reservation of library resources, as well as remote access to the databases. Since the introduction of RFID technology, users can use five self-service book-dispensing machines and check out books from the pick-up machines around the clock.

The library provides students, academic personnel and other stakeholders with various levels of individual consultations and group training in information literacy (https://www.rtu.lv/lv/studijas/biblioteka/lietotaju-apmacibas) (in Latvian).

Publications not available in the library are delivered via an interlibrary loan or an international loan.

Internet access is available throughout the library. The library has copying, scanning, printing, binding services and a self-service dining room.

Students, whose permanent residence is outside Riga or Pieriga, are offered accommodation at RTU hotels. These services are also available for incoming students and guest professors. In addition, RTU has also cooperation agreements with other accommodation providers to offer guests the desired level of comfort, if necessary.

Partnership - Vilnius Gediminas Technical University provides all the conditions for the successful implementation of the programme.

VGTU buildings have a free Wi-Fi connection, practically everywhere on campus for students to be able to join and study where they find it comfortable.

All lectures are held in one building complex Saulėtekio al. 11, with the exception of Road Safety Management, some lectures are held at Basanaviciaus str. The lectures are scheduled in a way the students do not have to commute from campus to Basanaviciaus street on the same day.

During the academic year of 2019-2020 from March 16 (during the COVID-19 pandemic), the study process was organised remotely using zoom and MS Teams platforms.

Vilnius Gediminas Technical University Library provides the university community with information and publications. Access to the library is a priority for members of the university community, as well as for teaching staff and students of other higher and high technical schools.

VGTU Library has a common reading room and the special reading room 24/7, active learning space, working areas. The reading rooms of the Central Library are located on the University Campus, making them popular and widely visited. Readers can work in a pleasant environment, convenient working hours – since 2007, a 24/7 Internet reading room has been opened. There are 63 computerised workspaces for readers. Library funds consist of educational, scientific, informational, periodic and continuous publications and dissertations, as well as research reports in technological, social, physical sciences and humanities. For leisure, the latest books of fiction and

science are offered – popular magazines. Books are found by searching the computer directory and finding the publication, ordered online according to the prepared instruction. If the publication is not available in the Library, it can be ordered from other Lithuanian or foreign libraries.

The VGTU has over 2,000 stationary computers, about 1,050 of them are located in computer classes and reading rooms. Together with laptops and tablets used by academic staff in the departments, about 2100 computers are dedicated for study and scientific purposes. There are computer classes installed, teaching staff computer workplaces with video projectors are installed in some classrooms. All computers are connected to a network with a broadband fibre optic Internet connection. In total 95% of the indoor area of the university, including all lecture and reading rooms, is covered with wireless WI-FI, with 380 wireless stops. The university data centre consists of 57 physical and 200 virtual servers with 1,185 processor cores, 5.06 terabytes of online and 766 terabytes of long-term storage capacity. All university buildings are connected by fibre optic cables, with data bandwidth on network highways of up to 10 gigabytes per second.

Studies at the VGTU are impossible without laboratories, not only for the students‘ training process but also for research to be carried out. All laboratory equipment is constantly updated so that students and university researchers have the best opportunities to create and improve.

The study process uses a variety of application software (will turn into 200 titles) installed not only in computer classes, reading rooms, but also available to teaching staff and students through the university cloud service from home computers. As an example, one of the world's most popular software among technology universities is the MATLAB/SIMULINK programme package, which includes over 100 modules from a wide range of scientific and technological fields, from mathematical calculations and mechanical systems modelling to the development of financial engineering and artificial intelligence systems.

It can be concluded that VGTU has all the necessary infrastructure for the successful implementation of the programme.

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

Not applicable

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

Both state budget financing and student funds will be used for the implementation of the study programme. Information on the expected financial resources of the programme is presented in

Table 3.1.1.

Table 3.1.1. Study Programme Funding

Academic year	State budget funding for the programme, EUR	Tuition fees, EUR	Total study programme funding, EUR	Cost per student, EUR
2016./2017.	34827,57	15	34842,57	5799,03
2017./2018.	11412,21		11412,21	6060,99
2018./2019.	19817,41		19817,41	6344,5185
2019./2020.	1654,61		1654,61	6607,563

The analysis of the information shows that the state budget grants for the study programme have increased during the reporting period. The cost per student has increased, which is justified by the overall increase in total RTU costs (utilities, building maintenance, etc.).

Information on the minimum number of students in RTU study programmes is provided in the appendix of the self-evaluation report "On the minimal number of students in study programmes".

Information on the funding distribution between the cost items is provided in the appendix of the self-assessment report "Funding distribution between the cost items".

The tuition fee for the “Innovative Road and Bridge Engineering” academic masters programme is 2000 EUR per semester. The programme has 5 budget places for Latvian and EU students.

3.4. Teaching Staff

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

In the academic Master study programme “Innovative Road and Bridge Engineering”, the scientific competence of the academic staff shall be evaluated based on the following criteria: publications in scientific journals indexed by SCOPUS or Clarivate Analytics with a citation index, other databases recognised in the scientific world, as well as participation in international and Latvian scientific journal editorial boards; participation in international projects.

One of the main aims of the Master studies is to promote close scientific and business cooperation,

and it is, therefore, necessary to educate and train professionals with a professional qualification that would allow them to be immediately involved in the work of companies or even to improve professional activity of companies. The competence of the academic staff shall also be determined by their activities: participation in technical committees of the construction industry, standardisation committees, working groups of Latvia and international institutions that draw up Eurocodes, ISO standards for the relevant areas; acquisition of construction certificates related to the field of study, which allow carrying out practical activities in the construction sector; raising qualifications at different courses in Latvia and at foreign universities.

The continuous development of academic staff's professional expertise and management experience has a positive impact on study programmes, since knowledge which is acquired based on theoretical and practical experience is more understandable, thereby facilitating the qualitative and effective implementation of the study programme.

From a development point of view, the University provides an opportunity for academic staff to develop educational or didactic expertise by organising a variety of courses, seminars, and tutorials free of charge.

A large number of publications during the reporting period could be considered one of the most significant high-quality scientific research indicators of the academic Master study programme "Innovative Road and Bridge Engineering". For example, in 2015-2021, a total of 183 articles by the academic staff working at the academic Master programme "Innovative Road and Bridge Engineering" have been published in the journals indexed in SCOPUS database, of which 57.9% are published in Open Access journals..

During the period of 2015-2021, publications of the academic staff of the academic Master study programme "Innovative Road and Bridge Engineering" contributed to the development of 80 thematic areas (32 thematic clusters). The year-by-year dynamics of changes in the number of publications are given in Fig. 4.2.2.

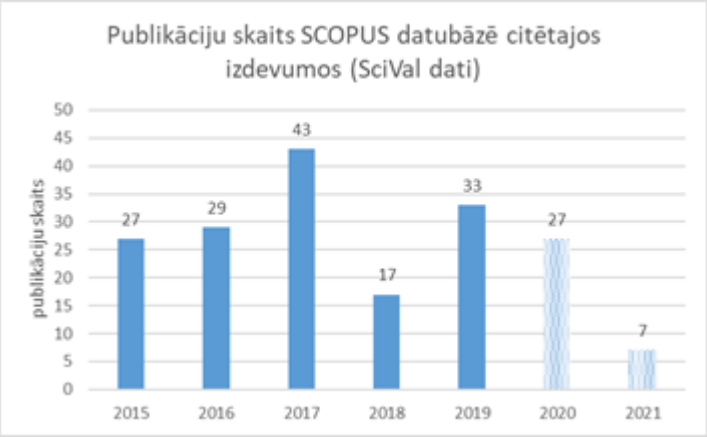


Fig. 4.2.2 The number of scientific articles of the academic staff of the academic Master study programme "Innovative Road and Bridge Engineering" (data for 2020 and 2021 are not complete).

Between 2015 and 2021, 183 publications were quoted 754 times, an average of 4.1 citations to 1 publication; 8.2% of publications were among the top 10% of the world's most quoted publications, while 12.9% of scientific articles (18 publications) were published in CiteScore top 10% journals. The dynamics of changes in the average number of citations per article is given in Figure 4.2.3.

Fig. 4.2.3. The dynamics of citations of the scientific articles of the academic staff of the academic Master study programme “Innovative Road and Bridge Engineering” (data for 2020 and 2021 are not complete)

Listed below are the most cited publications of the academic staff of the academic Master study programme “Innovative Road and Bridge Engineering” during the period of 2015-2021:

- Izaks, R., Haritonovs, V., Klasa, I. and 1 more. Hot Mix Asphalt with High RAP Content. (2015) Procedia Engineering, 114, pp. 676-684. Quoted 35 times.
- Oganisjana, K., Svirina, A., Surikova, S. and 2 more. Engaging universities in social innovation research for understanding sustainability issues. (2017) Entrepreneurship and Sustainability Issues, 5 (1), pp. 9-22. Quoted 32 times
- Zofka, A., Maliszewski, M., Bernier, A., Vaitkus, A. and 2 more. Advanced shear tester for evaluation of asphalt concrete under constant normal stiffness conditions. (2015) Road Materials and Pavement Design, 16, pp. 187-210. Quoted 28 times.
- Gribniak, V., Pérez Caldentey, A., Kaklauskas, G. and 2 more. Effect of arrangement of tensile reinforcement on flexural stiffness and cracking. (2016) Engineering Structures, 124, pp. 418-428. Quoted 26 times.
- Vaitkus, A., Čygas, D., Laurinavičius, A. and 2 more. Influence of warm mix asphalt technology on asphalt physical and mechanical properties. (2016) Construction and Building Materials, 112, pp. 800-806. Quoted 25 times.

The following qualitative and quantitative indicators show that the qualifications of the academic staff meet the requirements specified in Article 55 of the Law on Higher Education Institutions - 2 professors and associate professors, who have been elected to academic positions in RTU departments and are experts in their field approved by the Latvian Council of Science, participate in the implementation of the compulsory and the compulsory elective part of the study programme.

VGTU has been involved in the implementation of a joint master program with high-quality scientists and academic staff:

Prof. Dr. Darius Bacinskas lead course - Computer-Aided Design of Bridges (with course work). Professor Research interests are Nonlinear analysis of reinforced concrete elements, advanced reinforced concrete structures, numerical modelling of bridge structures, static and dynamic tests of bridge structures, dynamic analysis of bridges. Main publications:

1. Bačinskas Darius; Jakubovskis Ronaldas; Kilikevičius Artūras. Field testing of pedestrian bridges. In Load testing of bridges: current practice and diagnostic load testing. London: CRC Press, 2019. p. 249-290. (ISBN 9780367210823).
2. Rumšys Deividas; Bačinskas Darius; Kaklauskas Gintaris; Gribniak Viktor. Flexural stiffness of lightly reinforced beams made of structural lightweight aggregate concrete. ACI Structural

Journal, Vol. 116, Issue 5, 2019, p. 17-28.
3. Constitutive Modelling and Structural Application of Reinforced Self-Compacng Lightweight Concrete. Research project funded by Research Council of Lithuania, Grant Agreement No. MIP-093/2015, 2015–2017 m. Project manager D. Bačinskas.

Prof. Dr. Eugenijus Gudonis lead course - Steel-concrete Composite Bridge (with course work). Professor research interests Reinforced concrete structures and their research. Main publications:

1. Gribniak, Viktor; Tamulėnas, Vytautas; Ng, Pui Lam; Arnautovs, Aleksandrs; Gudonis, Eugenijus; Misiūnaitė, Ieva. Mechanical behavior of steel fiber-reinforced concrete beams bonded with external carbon fiber sheets // Materials. Basel : MDPI. ISSN 1996-1944. 2017, Vol. 10, iss. 6, p. 1-18. DOI: 10.3390/ma10060666. [Science Citation Index Expanded (Web of Science)] [M.kr.: T 008,T 002] [Citation Index.: 2,467 (2017, InCites JCR SCIE)] [author's contribution.: 0,166].
2. Gribniak, Viktor; Arnautov, Aleksandr K; Norkus, Arnoldas; Tamulėnas, Vytautas; Gudonis, Eugenijus; Sokolov, Aleksandr. Experimental investigation on capacity of steel fibres assuring structural integrity of reinforced concrete elements externally bonded with FRP sheets // Mechanics of composite materials. New York : Springer US. ISSN 0191-5665. eISSN 1573-8922. 2016, vol. 52, no. 3, p. 401-410. [Scopus; SpringerLink; INSPEC; Science Citation Index Expanded (Web of Science)] [M.kr.: T 002,T 008] [Citation Index.: 0,834 (2016, InCites JCR SCIE)] [author's contribution.: 0,166].
3. Gribniak, Viktor; Arnautov, Aleksandr K; Norkus, Arnoldas; Kliukas, Romualdas; Tamulėnas, Vytautas; Gudonis, Eugenijus; Sokolov, Aleksandr. Steel fibres: effective way to prevent failure of the concrete bonded with FRP sheets // Advances in materials science and engineering. New York: Hindawi Publishing Corporation. ISSN 1687-8434. eISSN 1687-8442. 2016, vol. 2016, art. no. 4913536, p. 1-10. DOI: 10.1155/2016/491353. [DOAJ; Scopus; INSPEC; Science Citation Index Expanded (Web of Science)] [M.kr.: T 002] [Citation Index.: 1,299 (2016, InCites JCR SCIE)] [author's contribution.: 0,142].

Prof. Dr. Daiva Žilionienė lead course - Innovative Scientific Solutions. Professor research interests Road design and research. Main publications:

1. Vaitkus, A., Žalimienė, L., Židanavičiūtė, J., & Žilionienė, D. (2019). Influence of temperature and moisture content on pavement bearing capacity with improved subgrade. Materials, 12(23), 1-29. doi:10.3390/ma12233826 [IF: 3,057; AIF: 5,274; quartille: Q2 (2019, InCites JCR SCIE)] [CiteScore: 3,50, SNIP: 1,212, SJR: 0,647 (2019, Scopus Journal Metrics)] [author's contribution: 0,250].
2. Dell'Aqua, G., De Luca, M., & Žilionienė, D. (2018). Using artificial neural network and multivariate analysis techniques to evaluate road operating conditions. Journal of risk research, 21(6), 679-691. doi:10.1080/13669877.2016.1264445 [IF: 1,699; AIF: 1,672; quartille: Q2 (2018, InCites JCR SSCI)] [CiteScore: 1,62, SNIP: 0,943, SJR: 0,556 (2018, Scopus Journal Metrics)] [author's contribution: 0,333].
3. Šneideraitienė, L., & Žilionienė, D. (2020). Assessment of skid resistance of road pavements. The Baltic journal of road and bridge engineering, 15(3), 157-168. doi:10.7250/bjrbe.2020-15.490 [DOAJ; TRIS Online; VINITI; Scopus; Index Copernicus; Science Citation Index Expanded (Web of Science)] [M.kr.: T 002] [CiteScore: 0,620 (2019, InCites JCR SCIE)] [author's contribution: 0,500].

Prof. Dr. Audrius Vaitkus lead the course - Innovative Pavement Structure Design (with course project). Professor Research interests Research, design and technologies of road pavement structures. Main publications:

1. Modular pavement (grant No. 01.2.2-LMT-K-718-01-0044) funded by EU Structural Funds

(2014-2020) No. 01.2.2-LMT-K-718, Scientific research within Smart Specialization.
2. Determination of binding properties of municipal solid waste incinerator bottom ash (BA) depending on BA fraction, amount and soil type and evaluation of BA mixtures suitability to construct frost blanket course.
3. Development of the design model for asphalt pavement structures and software package application.

Academic staff regularly improve their professional and academic knowledge by participating in methodological seminars, conferences (national and international), conducting scientific and research work, as well as by participating in various projects.

Academic staff may apply for education competence courses in other educational establishments of the Republic of Latvia or abroad. Academic didactic competence has improved during the reference period. Certificates for the completed training courses are issued to academic staff, demonstrating that didactic competencies have been improved and correspond to the aims of the University.

Implementing the academic master's study programme requires teaching staff, both with achievements in professional activity – in the design, construction, monitoring and maintenance of roads and bridges, and with advances in science to ensure the academic quality of the study process. For example, in the programme's implementation, we have involved assistant professor Janis Bidzans, who has projected a large part of the streets of Riga and has recognised authority in his sector. On the other hand, the programme is carried out by Professor Atis Zarins, who has perfected the spatial design methods of the roads, studied scientific articles and recognised a scientist. The varying qualifications of teaching staff – professionalism and scientific qualifications – allow for creating a balanced team of teaching staff to reach the aims and tasks of study.

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

On the part of RTU, 2 professors and 2 associate professors – Doctors of Science, whose scientific and academic qualifications corresponds to the regulations on the criteria for the election in the professor position, are involved in the implementation of the study programme.

1 elected associate professor – Doctor of Science, whose scientific and academic qualifications corresponds to the regulations on the criteria for the election in the position of an associate professor, is involved in the implementation of the study programme. 1 assistant professor holding a Doctor of Science degree is involved in the implementation of the study programme.

On the part of VGTU, 4 professors and 3 associate professors – Doctors of Science, whose scientific and academic qualifications corresponds to the regulations on the criteria for the election in the professor position, are involved in the implementation of the study programme.

During the reporting period, the changes were insignificant. Analysis showed that this happened for a variety of reasons:

1. The associate professors and assistant professors advanced their qualifications over the reporting period and became professors or associate professors, respectively;
2. The academic staff took part in grant competitions, and received funds and opportunities to conduct the research in the field, thus changing their academic position to a leading researcher position;

3. New industry specialists were recruited to promote introduction of advanced technologies in the study courses; thus, lecturers and assistants came to work in the programme.
4. Retirement of some members of academic staff;
5. Termination of employment due to commencing work in the construction sector in order to improve own qualification.

The overall changes during the reporting are given in table 4.1.1.

Table 4.1.1. Academic personnel involved in implementation of the study programme

Academic position	Academic year 2016/17	Academic year 2020/21
Professor	6	6
Associate professor	5	5
Assistant professor	1	1

The table shows that the programme involves qualified members of the academic staff, thus maximally adjusting the programme curriculum to the specifics and latest development in the sector.

Currently, RTU is implementing SAM 8.2.2 project on "Strengthening of Academic Personnel of Riga Technical University in Strategic Specialisation Areas" financed by the European Social Fund, one of the tasks of which is the renewal of academic personnel. The aim of the project is to strengthen RTU academic personnel in the areas of strategic specialisation in 10 study fields, including the study field "Architecture and Civil Engineering". The project activities are focused on three areas:

- Involvement of Doctoral students in the work of the academic staff at RTU,

- Involvement of foreign academic staff in the work of the academic staff at RTU,

- Improvement of the existing academic staff qualifications, including academic staff internship at an economic operator.

Within the project, academic staff have an opportunity to develop their competence at the courses in professional English, as well as specialized training courses.

In order to ensure and increase the impact of scientific activities and personnel development, RTU management signs an annual agreement with each RTU faculty, which sets specific quantitative indicators in the areas of studies, scientific activities and valorisation.

3.4.3. Information on the number of the scientific publications of the academic staff members, involved in the implementation of doctoral study programme, as published during the reporting period by listing the most significant publications published in Scopus or WoS CC indexed journals. As for the social sciences, humanitarian sciences, and the science of art, the scientific publications published in ERIH+ indexed journals or peer-

reviewed monographs may be additionally specified. Information on the teaching staff included in the database of experts of the Latvian Council of Science in the relevant field of science (total number, name of the lecturer, field of science in which the teaching staff has the status of an expert and expiration date of the Latvian Council of Science expert) (if applicable).

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

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

Within the study programme, there is a cooperation stimulation mechanism for academic staff that provides enhancement and integration of the study courses. Both student survey results and alumni survey results allow getting feedback, which identifies certain shortcomings. Thus, the study courses are improved on a regular basis, considering both student suggestions and industry development trends.

During the reconciliation of the study courses, all relevant academic staff are involved, ensuring that the themes considered within the study programme are continuously updated and optimized in cooperation with the associated industry professionals.

Cooperation of the academic staff within the study programme is considered to promote the achievement of the learning outcomes. Reviewing and updating the study programme, the academic staff mutually agree on the most appropriate and effective solutions for the evaluation of the learning outcomes and achievement of performance indicators. Periodical discussions and review of the study course syllabus help achieve thematically harmonized and complementary training, avoiding duplication of questions discussed in different courses within one study programme.

The rate of the RTU elected and permanently employed academic staff to students at the academic Master study programme “Innovative Road and Bridge Engineering” is approximately 1 to 2.

To ensure the functioning of the “Innovative Road and Bridge Engineering” academic programme, the partners' universities have established a council consisting of three representatives of each universality academic staff involved in the implementation of the master’s programme. The Council shall be convened twice in the study year and shall examine the relevant topics: the quality of

studies, matters regarding the teaching staff who will be involved in the implementation of the programme, as well take decisions on the renewal of study courses and on the modernisation of the programme. Partner University cooperation also undertakes internships between researchers in RTU and VGTU, and studies are taking advantage of the opportunities provided by exploratory laboratories.

Annexes

III - Description of the Study Programme - 3.1. Indicators Describing the Study Programme		
Sample of the diploma and its supplement to be issued for completing the study programme	Diploma examples RBMI0 with atachement.pdf	Diploma paraugs RBMI0 ar pielikumu.pdf
For academic study programmes - Opinion of the Council of Higher Education in accordance with Section 55, Paragraph two of the Law on Higher Education Institutions (if applicable)	Nr_85_RTU_MG_Kopīgā_par+250+stud (in Latvian).pdf	Nr_85_RTU_MG_Kopīgā_par+250+stud.pdf
Compliance of the joint study programme with the provisions of the Law on Higher Education Institutions (table) (if applicable)	RBMI0 4.pielikums_Kopīgās studiju programmas atbilstība augstskolu likumam_EN + agreement.pdf	RBMI0 4.pielikums_Kopīgās studiju programmas atbilstība augstskolu likumam + līgums.pdf
Statistics on the students in the reporting period	RBMI0 5.pielikums ENG Magistri starpt.pdf	RBMI0 5.pielikums Magistri starpt.pdf
III - Description of the Study Programme - 3.2. The Content of Studies and Implementation Thereof		
Compliance with the study programme with the State Education Standard	RBMI0 6. pielikums_Mg_EN.pdf	RBMI0 6. pielikums.pdf
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard or the requirements for professional qualification (if applicable)		
Compliance of the study programme with the specific regulatory framework applicable to the relevant field (if applicable)		
Mapping of the study courses/ modules for the achievement of the learning outcomes of the study programme	RBMI0 8.pielikums ENG.docx	RBMI0 8.pielikums.docx
The curriculum of the study programme (for each type and form of the implementation of the study programme)	RBMI0 9.pielikums ENG.pdf	RBMI0 9.pielikums.pdf
Descriptions of the study courses/ modules	BMI0_Studiju kursu apraksti_EN.pdf	BMI0_Studiju kursu apraksti_LV.pdf
Description of the organisation of the internship of the students (if applicable)		
III - Description of the Study Programme - 3.4. Teaching Staff		
Confirmation that the academic staff of the doctoral study programme includes not less than five doctors, of which at least three are experts approved by the Latvian Council of Science in the branch or sub-branch of science in which the study programme intends to award a scientific degree (if applicable)		
Confirmation that the academic staff of the academic study programme complies with the requirements specified in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions (if applicable)	Confirmation - on compliance of the academic staff.edoc	Apliecinājums - AL 55. pants par prof. skaitu akadēmiskās programmās.edoc

Civil Engineering (43582)

Study field	*Architecture and Construction*
ProcedureStudyProgram.Name	*Civil Engineering*
Education classification code	*43582*
Type of the study programme	*Academic bachelor study programme*
Name of the study programme director	*Juris*
Surname of the study programme director	*Smirnovs*
E-mail of the study programme director	*juris.smirnovs@rtu.lv*
Title of the study programme director	*Profesors/ Dr.sc.ing.*
Phone of the study programme director	
Goal of the study programme	*The aim of the study programme is to educate and train highly qualified multi-discipline specialists with academic education, characterized by systemic thinking and awareness, who are able to keep up to date with technological development and successfully participate in launching new technologies, as well as to provide students with the body of knowledge, skills and competences in accordance with the requirements of the 6th level of the Latvian Qualifications Framework.*
Tasks of the study programme	*The tasks of the study programme:* *- to ensure competitive higher academic education corresponding to the international standards, to prepare students for practical work, to develop research skills of the students and promote their practical application;* *- to develop student ability to adapt technologies and systems developed abroad for the local conditions;* *- to develop student knowledge and advance their professional skills and competences within the study programme, so that they can demonstrate relevant academic results and reach learning outcomes in each study year and integrate them in research;* *- to develop student ability to implement innovative projects aimed at ensuing sustainable construction and reduction of environmental pollution;* *- to provide students with comprehensive knowledge in civil engineering, to develop student professional skills and develop their competence in accordance with the labour market demands;* *- to develop student ability to recognize problems, set and reach aims for their solution, suggesting practical solutions of specific problems within study courses and graduation papers;* *- to promote cooperation among students and academic staff in the process of development of research papers, adopting best practices in practical implementation of the obtained results at industry enterprises, as well as to ensure publication of the research results;* *- in the course of studies, to develop student intelligence, to encourage their personal fulfilment, to promote application of their intellectual abilities in the study process and further in their professional activities;* *- to motivate students and alumni to continue studies at post-graduate study programmes, to promote life-long learning, as well as academic and research excellence.*

Results of the study programme	*Learning outcomes of the study programme:* *- able to apply the acquired theoretical and practical knowledge in their work in the construction industry;* *- able to perform their work, in compliance with the requirements of the binding, industry-specific, system-, process-, and product-related norms and regulations and standards;* *- able to understand in detail and demonstrate the knowledge of diverse specific facts, principles, processes and concepts in standard and non-standard situations in definite academic or professional fields;* *- able to demonstrate knowledge of technologies and methods for performing study and work tasks;* *- able to plan and organise work using various methods, technologies, tools, equipment and materials in performing the tasks;* *- able to find, evaluate and creatively use information for completion of study and professional tasks and problem solving;* *- able to cooperate, plan and complete study or work tasks in their professional field individually, in a team or managing the work of a team.*
Final examination upon the completion of the study programme	*Bachelor Paper that contains analytical research with the elements of scientific research work in the sub-fields and sub-disciplines of civil engineering on the theme individually assigned to the student.*

Study programme forms

Full time studies - 3 years - english

Study type and form	*Full time studies*
Duration in full years	*3*
Duration in month	*0*
Language	*english*
Amount (CP)	*120*
Admission requirements (in English)	*general or vocational secondary education, English language level B2*
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	*Bachelor of Engineering in Construction and Civil 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

3.1. Indicators Describing the Study Programme

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

The Academic Bachelor Study Programme "Civil Engineering", education classification code 43582, was established on 25 November 2019 (RTU Senate Decision No 634). The programme was licensed on 10.06.2020 (licence No. 04051-184) and is currently in the process of accreditation for a period of six years.

Academic volume: 120 CP / 180 ECTS.

General secondary education or vocational secondary education is required to enrol in the study programme, as well English language level B2. Successful completion of the study programme will lead to awarding of a Bachelor of Engineering degree in Building and Civil Engineering.

The type of study programme is full time only – 3 years. The full-time study programme is implemented according to RTU standard plan, with 2 semesters per academic year, each semester lasting 20 weeks - 16 study weeks and 4 weeks of examination session.

The study programme is implemented in Riga; it will not be implemented at RTU branches.

The study programme will be implemented in English only.

See Annexes 9 and 10 for the course outline and course descriptions.

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

The Academic Bachelor Study Programme "Civil Engineering" has been developed in accordance with the Law on Higher Education Institutions of the Republic of Latvia and the Classification of Education of the Republic of Latvia.

The principles of the Latvian Qualifications Framework (LQF) and the European Qualifications Framework (EQF) are maximally observed during the implementation and development of the study programme.

The study programme has been developed taking into account strategic objectives of RTU, market supply and potential demand.

It was planned to start the academic Bachelor study programme "Civil Engineering" in 2020, but now it is planned to start it in 2021.

The study programme has been developed in line with RTU Strategy and requirements of the study field “Architecture and Civil Engineering”. Students develop the envisioned skills and competences under guidance of academic and research personnel with European qualifications, who in their daily work render expert services at the national and international level, as well as highly qualified academic staff with many years of professional experience. The study programme facilitates development of the overall education export potential, it is aimed at promoting interest in education in the field of civil engineering. Innovative teaching and learning methods are employed in programme implementation – special focus is made on the development of practical skills and active use of modern technologies. As mentioned, the envisioned language of instruction is English.

The **aim** of the study programme is to educate and train highly qualified multi-discipline specialists with academic education, characterized by systemic thinking and awareness, who are able to keep up to date with technological development and successfully participate in launching new technologies, as well as to provide students with the body of knowledge, skills and competences in accordance with the requirements of the 6th level of the Latvian Qualifications Framework.

The strategic aim of the Faculty of Civil Engineering, within the framework of the existing RTU strategy, is to ensure internationally competitive high-quality scientific research, tertiary education, technology transfer and innovation in civil engineering for the Latvian national economy and society, supported by strategic tasks - high-quality study process, excellent research, sustainable commercialization/valorisation.

In today's global higher education market, the existence of high-quality civil engineering education is an essential element of a university's curriculum, as energy efficiency and conservation together with of emission and waste reduction is one of the EU's key objectives in the fight against climate change.

The **tasks** of the study programme:

- to ensure competitive higher academic education corresponding to the international standards, to prepare students for practical work, to develop research skills of the students and promote their practical application;
- to develop student ability to adapt technologies and systems developed abroad for the local conditions;
- to develop student knowledge and advance their professional skills and competences within the study programme, so that they can demonstrate relevant academic results and reach learning outcomes in each study year and integrate them in research;
- to develop student ability to implement innovative projects aimed at ensuing sustainable construction and reduction of environmental pollution;
- to provide students with comprehensive knowledge in civil engineering, to develop student professional skills and develop their competence in accordance with the labour market demands;
- to develop student ability to recognize problems, set and reach aims for their solution, suggesting practical solutions of specific problems within study courses and graduation papers;
- to promote cooperation among students and academic staff in the process of development of research papers, adopting best practices in practical implementation of the obtained results at industry enterprises, as well as to ensure publication of the research results;
- in the course of studies, to develop student intelligence, to encourage their personal fulfilment, to promote application of their intellectual abilities in the study process and

further in their professional activities;
- to motivate students and alumni to continue studies at post-graduate study programmes, to promote life-long learning, as well as academic and research excellence.

Upon completion of the study programme, a graduate will be able (**learning outcomes**):

- able to apply the acquired theoretical and practical knowledge in their work in the construction industry;
- able to perform their work, in compliance with the requirements of the binding, industry-specific, system-, process-, and product-related norms and regulations and standards;
- able to understand in detail and demonstrate the knowledge of diverse specific facts, principles, processes and concepts in standard and non-standard situations in definite academic or professional fields;
- knows technologies and methods for performing study and work tasks;
- able to plan and organise work using various methods, technologies, tools, equipment and materials in performing the tasks;
- able to find, evaluate and creatively use information for completion of study and professional tasks and problem solving;
- able to cooperate, plan and complete study or work tasks in their professional field individually, in a team or managing the work of a team.

Performance indicators of the tasks of the study programme are the results of student studies, graduate employment rates, employer feedback, expansion of international cooperation, increase in the number of research projects, increase in the number of students involved in the research process, approval of research results in companies, as well as independently developed Bachelor Paper, which has significant theoretical significance and practical application features, which includes results of original scientific research, demonstrating student's competences to independently obtain, select and analyse information and use it in the development of the construction industry.

Title of the study programme, degree to be obtained, aims, tasks and learning outcomes (knowledge, skills, competences) are interrelated and the probability of their achievement is very high.

The programme is open to applicants with general or vocational secondary education, as well B2 Upper-Intermediate level of English.

Graduates of the study programme will obtain a Bachelor of Engineering in Construction and Civil Engineering. Graduates are prepared for further studies at the Master's level.

The study programme promotes implementation of the leitmotif of Riga Technical University (RTU) as defined in its 2021-2025 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 educated and trains European and global-level engineers – leaders: developers of new technologies." (Strategy | Riga Technical University (rtu.lv)).

The duration of the study program is 3 years' full-time study. Its amount is 120 CP, which includes compulsory study courses, compulsory elective study courses, elective study courses and state examination, which include a Bachelor Thesis. It is possible to study the study program full-time in English, which is highly valued and used by students from European countries and countries from outside of Europe.

Programme code 43582 complies with Cabinet of Ministers Regulation No 322 Latvian Classification of Education. The first and second levels of classification, represented by the first two digits of code 43, are Academic education (bachelor's degree), following general or vocational secondary education. The third, fourth and fifth levels of classification (thematic groups, subject areas and programme groups), denoted by the next three digits 582, are Civil Engineering (58 stands for Architecture and Civil Engineering).

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

The study program comprised by it conform with the strategic development directions of the university, the needs of the public and the national economy and development trends. All the programs include the requirements of the Latvian and the European Union legislation.

The economic and social substantiation of the study program is based on performed industry surveys, which are regularly performed on annual basis by the Ministry of Economics, and it is aimed at following up the development trends of the civil engineering field, including fluctuations in the increase of the construction and the indices of increase of the construction costs, in order to identify factors hindering development of the industry and eventual overheating risks in a timely manner, as well as forecasting the production scope and costs in the next years by applying forecasting methods. The survey reveals that during the whole period from 2020 to 2024 the experts and combined forecasts predict further increase of the industry costs. During the period from 2020 to 2022 this increase could be estimated within a range of 1% to 5% per year, and in 2024 it could achieve 6%. According to the forecast the biggest increase of costs relates to labour costs where the combined forecast predicts a general increase of 8% to 10% per year over the period from 2020 to 2024. As regards sub-fields, in 2020 a decrease of the industry costs is predicted in the construction of residential and non-residential buildings, as well as in the construction of roads and highways. The most rapid increase is predicted in the construction of bridges and tunnels. An increase of costs in all the sub-fields is forecasted as from 2022 by the construction of bridges and tunnels leading with an annual increase of 5-7%.

The industry researchers have concluded that also defects and deficiencies in construction design documents and insufficient scope of preliminary studies present risks of increase of prices on the level of individual sites in the industry of architecture and civil engineering. In order to mitigate this risk, it is important to implement the building information modelling (BIM) system in Latvia as soon as possible, as it can considerably improve the quality of construction design documents, contribute to predictability of construction, optimise organisation of construction works and their sequential performance, reduce construction terms and improve efficiency of project management and supervision.

The civil engineering industry has experienced very fast development as from 2017. Its growth amounted to 19.4% in 2017 and to 21.9% in 2018; construction volumes increased in all the core groups of construction during the last year. Both availability of the EU funding and private investment encourage the industry growth. Attraction of employees in the industry has restarted since 2018, the number of employees was 74.6 thousand last year accounting for 30% increase compared to 2010, however, the pace of the growth was lagging behind that of the production growth. The wages of employees have increased considerably in the industry during the last two years and last year they amounted to 94.6% of the mean wage in the national economy.

The analyse of the employment of graduates, can't be carried out because the programme has only started this academic year. But according to employment of other Civil Engineering programmes, around 90% of students find a job in the industry after graduation.

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

The Academic Bachelor Study Programme "Civil Engineering" has been implemented in academic year 2021/2022 after receiving the licence, admitting 6 students to the program.

Countries of destination Pakistan, Nepal, India, Azerbaijan and Sri Lanka (2 students from India).

The plan was to start studies in the academic year 2020/2021, but unfortunately due to travel restrictions because of the global epidemiological situation this was not possible and no foreign students were enrolled at the beginning of the academic year.

In order to ensure the quality of the study process, the number of students required for the programme is 20.

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

3.2. The Content of Studies and Implementation Thereof

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

The Academic Bachelor Study Programme "Civil Engineering" will be implemented through lectures, practical and laboratory classes, field trips to companies, as well as independent studies, learning the basics of construction industry and its relationship with other sectors of economy.

The content of the study programme complies with the requirements of the regulatory enactments and is developed in compliance with the provisions of the RTU Senate Decision on "Joint Requirements for Study Programmes". The study courses included in the Bachelor's study programme are divided into the following blocks:

- Compulsory study courses providing understanding of the nature, structure and elements of engineering processes and their relationships;
- Field-specific study courses that provide knowledge about construction engineering processes, technological system evaluation methods, optimisation possibilities, teaches to understand the development of the national economy, including compliance with European laws and regulations, understand the principles of sustainable development, and scientific research development, etc.;
- Humanities and social sciences study courses demonstrating the interdisciplinary nature of the field of environmental engineering;
- Language courses developing students' ability to work with scientific and methodological literature available in English;
- Upon completion of the study programme, students develop a Bachelor Paper and present it publicly in front of the Bachelor Paper Examination Committee.

Duration of full-time Bachelor's studies is 3 years, divided into 6 semesters, when a student has to learn compulsory, field specific and free elective study courses, and develop a Bachelor Paper. The volume of the study programme is 120 CP (1 CP/week x 120 weeks). The study programme is open to applicants with general secondary education or vocational secondary education.

To ensure integration between the knowledge, competences and skills acquired by graduates in the development and implementation of study courses, particular emphasis is made on:

- reflection of actual case studies in the curriculum of the study programme (at the level of lectures, practical work and laboratory work), including the analysis of real case studies of study programme cooperation companies and the provision of solutions within the syllabus of specific study course;
- use of modern teaching methods (specialised software solutions, use of a single solution algorithm, solution-oriented methods, etc.);
- integrity of the study courses and the study programme, i.e., by developing a cross-curricular learning approach;
- improvement of study methods, distance learning using RTU e-learning environment ORTUS.

In order to obtain a Bachelor degree in of Engineering in Construction and Civil Engineering, a student must complete the requirements of the study programme and defend a Bachelor Paper. The study programme is completed by the elaboration of a Bachelor Paper and its public defence at the RTU FCE Graduate Paper Examination Committee. The developed Bachelor Paper must be publicly defended. A reviewer is appointed to evaluate the paper. The progress of the Bachelor Paper is monitored by regular meetings with the supervisor.

The aim of the study programme - "to educate and train highly qualified multi-discipline specialists with academic education, characterized by systemic thinking and awareness, who are able to keep up to date with technological development and successfully participate in launching new technologies", which corresponds to the European Qualifications Framework (EQF) and Latvian Qualifications Framework (LQF) Level 6 - is achieved.

The Academic Bachelor Study Programme "Civil Engineering" is in line with construction trends in the EU and worldwide. During its development, the changes in the construction industry in Latvia and across Europe were studied. The main emphasis was placed on the introduction of new

technologies in the teaching process, as well as training students in the use of building information modelling already in the course of study. The EU Building Information Modelling (BIM) representatives stress that BIM is a new opportunity that the digital age offers to significantly increase the construction quality and productivity, and therefore the introduction of BIM in the study programme is also essential. Construction using a BIM approach is more reliable and productive, as it allows those involved in construction to use the available resources - both human and financial - more efficiently.

As the study programme is developed for foreign students, one of the aims is to make the study programme as similar as possible to other technical university study programmes around the world, while at the same time maintaining the national good practice we have established in Latvia, making the study programme attractive to young professionals in the field. Comparisons were made with the universities in different European regions - Portugal, Italy, UK, Liechtenstein, Lithuania - in order to make the analysis as comprehensive as possible. The universities analysed were selected to have a field of study relevant to the construction sector, then it was investigated in depth whether the field of study also had similar programmes in terms of content - academic bachelor's degree programmes that are completed over three years, and then further in-depth research was carried out into the content, delivery and technical capabilities of the courses.

The study courses were found to be similar in content to the study courses developed within the study programme, which supports and respects the overall trends in the construction industry, and the general opinion of the required study courses for professionals in this field.

Comparing the study programme with other study programmes, it can be concluded that the developed study programme is modern and follows the latest trends outside Latvia, as well as it is specific enough in Latvia to claim that it has its own well-defined place in the family of other study programmes in the field of engineering sciences.

The academic staff of the programme will regularly follow and update the study courses so that they are based on the achievements and acknowledgements of the respective field of science. Course descriptions will be approved by the Programme Director and the Head of Department prior to the start of each semester to keep abreast of academic staff workload and possible development. The teaching staff also update the content of study courses in accordance with the trends of scientific development, using information available in the databases of scientific articles - EBSCO, Emerald, Scopus, Web of Science, etc. Academic personnel are motivated to publish the results of their research, especially in the scientific databases SCOPUS and Web of Science, with a royalty for each article published in these databases. The results of the academic staff development are evaluated each year during the annual appraisal and the results are used to plan further professional advancement of each member of the academic staff.

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

Not relevant!

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

Each study course of the **Academic Bachelor Study Programme "Civil Engineering"** defines the knowledge, skills and competences to be acquired, which contribute to the achievement of the learning outcomes of the study programme. The forms of assessment shall be determined by the academic staff in accordance with the learning outcomes of the study course. Each instructor within their study course tests the knowledge, skills and competences of the students specified in the course description (papers, tests, presentations, independent works, case study analyses, group works, etc.). The final grade is the sum of all test papers and examination grades, the percentages of which are also indicated in each course description and presented to students at the beginning of the semester.

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 in ORTUS portal 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 program and learning outcomes are taken into consideration.

Most commonly, to assess knowledge and to demonstrate what one has learned within the study course, tests or assignments are used. Skills are assessed mostly through practical, analytical, creative individual and group assignments that require the student to apply the acquired knowledge in practice. In turn, students demonstrate the acquired competences by presenting, discussing and justifying what they have learned in the course, both orally and in writing.

The acquisition of knowledge, skills and competences within the study programme includes theory, practical examples, lectures, group assignments, interactive discussions, and lectures by guest lecturers from the industry.

The Academic Bachelor Study Programme "Civil Engineering" is implemented on a full-time basis, with the number of examinations being determined by the amount of credit points of each course.

All study courses included in the study programme are implemented in accordance with the course descriptions. The study courses are evaluated in accordance with the RTU Senate Decision of 29 March 2010 "On the Regulations for Evaluation of Learning Outcomes", the RTU Senate Decision of 25 May 2001 "On the Criteria for Evaluation of Learning Outcomes " and the RTU Senate Decision of 29 January 2001 "On the Transition to a Unified Evaluation of Study Results" in a 10-point system (10 - excellent, 1 - very, very poor). The examinations consist of tests, study papers and exams

according to the study plans approved for each semester.

A student can only present their Bachelor Paper once they have mastered the entire study programme curriculum. Study courses in which a negative mark has been obtained must be retaken.

The principles of student-centred education will also be taken into account in the implementation of the study process, which will be implemented in the following way:

- Student involvement in the study process and development:

Riga Technical University regularly analyses the questionnaires that each student completes at the end of the semester for each course. The students also organise meetings with the programme director to discuss the positive and negative features of the semester courses, as well as the competence, abilities, attitude and quality of each member of academic staff. In this way, students have the opportunity to influence the study process and contribute to its improvement.

- Respecting students' abilities:

Academic staff take into account and respect student diversity and their needs, using different ways of delivering the programme according to students' capabilities.

- Handling student complaints:

The University has appropriate procedures in place to deal with student complaints. The complaints process is channelled through the Programme Director and the Head of Department, the Head of the Department of Studies or even the Vice-Rector for Academic Affairs, if necessary. At the Study Programme "Civil Engineering", students first solve problems with the Programme Director, thus the issues to be solved are addressed in a timely manner. For example, if the Programme Director receives a complaint from students about the inadequacy of a course or the incompetence of an instructor, the next step is to find out the reasons and attend the relevant lectures; if the students' complaint is justified, the instructor is instructed to improve the course or is replaced by an instructor whose competence is appropriate for the course.

- Competence development for academic personnel:

Courses and seminars are regularly organised for academic personnel, both on pedagogical methods and on technological possibilities for improving the quality of courses and their own qualifications. RTU regulations stipulate that a member of academic staff should also deliver guest lectures at foreign universities, which also directly increases their abilities and the quality of communication. In 2021, RTU organised the following training for the personnel - training on the e-learning environment (Moodle), use of Zoom and Teams (which significantly increased the mobility of teaching staff due to the epidemiological situation), training on audio-visual systems for remote lectures, as well as regular trainings on RTU information systems (usage of ortus.lv). Any other type of training for elected academic personnel in their field is also supported.

- Teaching and learning methods:

Pedagogical methods, ways of teaching, learning and assessment are regularly evaluated. Topical issues are discussed at departmental meetings, at the meetings of the Methodological Council. At the end of the course, students evaluate the performance of each member of academic staff by completing a course evaluation questionnaire. Students have the possibility to apply for personal tutorials, which are organised either systematically every week or by appointment at fixed times. Some courses also use methods where students can self-assess and engage in group work to facilitate learning.

- Fostering student autonomy:

Studies rely on the student's autonomy, while at the same time providing guidance and support from the instructor - the description of each study course specifies the scope and content of students' independent work, as well as the methods of its assessment.

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

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

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

The final examination within **the Academic Bachelor Study Programme "Civil Engineering"** is a Bachelor Paper in the amount of 10 CP.

The final examination is a specific research project in the field of construction - a Bachelor Paper. At the final examination, the student must demonstrate the ability to carry out analytical research with elements of scientific work in the sub-disciplines represented by the specialisation of construction sciences on the topic assigned to the student individually. The results of the research must be based on the analysis of scientific and technical literature sources.

The **aim** of the Bachelor Paper is to demonstrate the student's ability to independently carry out research in which the author demonstrates the ability to apply the knowledge acquired in studies, to select and analyse theoretical and practical solutions described in literature sources, to demonstrate understanding of practical solutions based on the results of the analysis.

The procedure for developing students' final theses includes the coordination of the Bachelor Paper topic with the scientific adviser and the head of the department. Students choose the area of focus of Bachelor Papers from the offered sample topics at each department, respectively the head of the department also offers a competent Bachelor Paper supervisor according to the chosen topic.

The student and the supervisor also agree on the calendar plan, but control deadlines have been

developed at each department, taking into account that there are 16 study weeks in both autumn and spring semesters.

Graduate paper Viva Voce are scheduled twice a year - at the end of January and the beginning of June. Before the Viva Voce, the paper is reviewed by reviewers approved by the Head of Department. The Viva Voce of the Bachelor Paper is held publicly and is evaluated by the State Examination Committee appointed by the Rector of RTU, which consists of the representatives of professional associations and companies in the construction industry.

In recent years, taking into account the themes of the Professional Bachelor graduates, as there have been no graduates at this academic programme yet, examples of the themes are:

The examples of bachelor thesis topic over the last years could be as follows:

- Opportunities of augmented reality and computer vision application to civil engineering.
- Zero-energy buildings in urban environment.
- Building information system (BIS).
- Development and possible application of automated design in civil engineering.
- Application of augmented and virtual reality to improve efficiency and outcomes of building construction processes.
- Location-based time table development for construction activities using integration with a 3D model.
- Development of Magnesium Oxide building material, using dolomite waste.
- Economic comparison of pre-fabricated and cast-in-situ reinforced structures in the Latvian construction sector.
- Analysis of steel lattice girder resistance.
- Comparison of reinforced concrete pile load calculation techniques.
- Steel rope roof function analysis.
- Analysis of rational CLT floor panel opportunities.
- Evaluation of explosion impact on high rise reinforced concrete loadbearing structures.
- Application of tribology and testing to concrete materials.
- Recycling of concrete waste and production of raw materials for new concrete and reinforced concrete.
- Applications of nanochemistry in construction materials.

Analysing the wide range of topics, it can be concluded that both teaching staff and students demonstrate their skills, knowledge and competences at a very high level and in line with the topicality of the field. The choice of topics is based on the student's interest in current developments in the field and on the student's preferences for future career choices, and the final thesis topics owe to the sustainability and development of the programme as a whole.

3.3. Resources and Provision of the Study Programme

3.3.1. Assessment of the compliance of the resources and provision (study provision, scientific support (if applicable), informative provision (including libraries), material and technical provision, and financial provision) with the conditions for the implementation of the study programme and the learning outcomes to be achieved by providing the respective examples.

RTU Faculty of Civil Engineering (FCE) continuously monitors compliance to quality requirements of rooms and technical equipment, the appropriate lecture halls with necessary multimedia hardware have been equipped. In general, in the FCE building at 6A Ķīpsalas Street 4 computer rooms, 23 lecture rooms, 35 laboratory rooms are available for the needs of the study process. In order to ensure the qualitative study process, FCE is carrying out extensive refurbishment works, upon their completion the Faculty will meet international standards for campuses and lecture halls. Classification of the premises is given in the table below.

Room type	Number of rooms	Useful area m²
Meeting room	1	70.91
Computer rooms	4	243.77
Auditoriums	23	1702.34
Teachers' rooms, cabinets	69	1523.61
Assistant professor / Doctoral student premises	5	196.24
Workspace / workshop	6	172.19
Research facilities	6	350.53
Laboratories	35	1256.83
Resource room	6	213.53
Auxiliary room	11	197.99
Anteroom	3	35.89
Student self-government and record keeping	3	260.43
Kitchen	1	16.43
Total		**6240.69**

The study process will be mainly provided by FCE academic and technical staff in cooperation with the following RTU departments:

- Department of Engineering Mathematics;
- Institute of Technical Physics;
- Department of Chemistry;

- Department of Labour and Civil Protection;
- Department of Innovation and Business Management;
- Department of Social Sciences;
- Department of Languages for Specific Purposes.

FCE institutes provide education and learning support: develop and update descriptions of the study courses, implement the corresponding study courses (including practical and laboratory works and seminars), supervision and defence of the graduate papers, and other activities related to learning, teaching and research work.

In 2017 – 2020, substantial investments were made in the research infrastructure. For example, the Institute of Transport Engineering had acquired such equipment as a Hamburg testing device (automatic Hamburg two-wheel tracker), as well as a roller-compactor, a four-point fatigue testing machine (four-point beam bending machine), a drone with infrared camera for open-air drone-based measurements and reading, as well as a high-resolution camera for additional imaging. In 2021, the Institute of Materials and Structures in cooperation with the largest manufacturer of construction materials in Latvia – “Sakret” Ltd., established a new laboratory – 3D concrete printing laboratory equipped with a 3m x 3m concrete 3D printer. In 2020, FCE founded the Centre for Digital Building Technologies that carries out active research and training in Building Information Modelling (BIM).

The Scientific Library of RTU (https://www.rtu.lv/en/studies/scientific-library) is an academic library of state significance, which has obtained its status as a result of library accreditation. The Scientific Library of RTU provides the necessary information for RTU study process and research activities, performs library, bibliographic and information services for RTU students, teaching staff, and employees. The Library's collection includes 1.4 million printed documents and e-resources in the databases relevant to RTU fields.

In 2016, significant investment was made in the development of the library infrastructure, with the construction of an additional 2240 m2 of space for the Central Library. The total area of the library premises is 6393 m2, of which 3417 m2 are for reader services. There are 713 workstations for library users. The library has four group rooms and six individual cubicles, a Western reading room and a conference room. The library is accessible to users with reduced mobility.

To improve the work of the Scientific Library of RTU and to ensure the availability of information needed for study and research work, the Library Council has been established, which decides on the replenishment of the library's collection with printed publications and subscriptions to the necessary databases. The Library Council has approved the "RTU SL Collection Completion Policy", which defines the basic principles of collection formation and development in accordance with the directions of RTU study and scientific activities.

When RTU provides funding for the library, the funding for information resources for each study programme is calculated. The collection is replenished according to the recommendations of the heads of study programme, researchers, and the allocated funding. The desired titles can be ordered by contacting the Library's Collection Development Department, ordering on the Library's website, filling in the order form, filling in the application form, by phone or by visiting the Library. The Scientific Library offers a guide to ordering titles and e-resources, which brings together the websites of various publishers and bookshops in Latvia and abroad.

Database subscription contracts are concluded both directly with the supplier and through the "Cultural Information Systems Centre" state agency, which is the Latvian national representative of the international non-profit organisation EIFL (*Electronic Information for Libraries*, http://www.eifl.net/). The EIFL Licensing Programme offers national libraries subscriptions to

internationally recognised databases at significantly reduced subscription fees not offered to individual subscribers, thus saving financial resources of the libraries.

The database subscriptions maintained by RTU Scientific Library

(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.
- Databases financed by the Ministry of Education and Science available to RTU Scientific Library: ScienceDirect, SCOPUS (Elsevier), Web of Science.
- Latvian databases: LETA, Letonika, the Database of Latvian Standards (available on the premises of the Library).

Database usage at the Scientific Library of RTU has been growing since 2016. E-resource loans have increased from 75,391 to 525,194 items.

The new library premises have allowed to extend the range of services. Since the opening of the new premises in 2018, the number of visits to the library has increased from 103,825 to 235,600. The Scientific Library of RTU is open to everyone. The Central Library is open to users from Monday to Saturday. There is a 24/7 reading room. During the summer period, the Central Library is open every weekday with reduced opening hours. (https://www.rtu.lv/writable/public_files/RTU_library_general_info_2020.pdf)

The library's sources are housed in an open-access collection. Books and periodicals according to the field of study and the UDC indexes are located in the central building of the Scientific Library, 5 Paula Valdena Street, Riga. The last copies of the oldest publications corresponding to the RTU profile are kept in the library repository. They are always available to the users.

The librarian on duty helps visitors find their way around the collection. Bibliographers (information specialists) provide more detailed information and advice. The library has a branch librarian service (https://www.rtu.lv/lv/studijas/biblioteka/nozaru-informacija (In Latvian)).

The library resource search is supported by the Primo Discovery search tool (https://www.rtu.lv/lv/studijas/biblioteka/vienota-informacijas-meklesana (In Latvian)). It allows searching the library catalogue (https://kopkatalogs.lv/F/?func=find-b-0&local_base=rtu01 (In Latvian)), the subscribed databases, as well as databases created by the RTU Scientific Library (https://www.rtu.lv/lv/studijas/biblioteka/informacijas-meklesana/datubazes-eresursi/bibliotekas-veidotas-datubazes (In Latvian)) in one interface. Searching for information in the electronic joint catalogue (https://kopkatalogs.lv/F (In Latvian)), it is possible to simultaneously obtain information on the resources available in 12 Latvian libraries. Both the electronic catalogue and the RTU portal ORTUS allow remote reservation of library resources, as well as remote access to the databases. Since the introduction of RFID technology, users can use five self-service book-dispensing machines and check out books from the pick-up machines around the clock.

The library provides students, academic personnel and other stakeholders with various levels of individual consultations and group training in information literacy (https://www.rtu.lv/lv/studijas/biblioteka/lietotaju-apmacibas (In Latvian)).

Publications not available in the library are delivered via an interlibrary loan or an international loan.

Internet access is available throughout the library. The library has copying, scanning, printing,

binding services and a self-service dining room.

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

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

Only student funds will be used for the implementation of the study programme. Information on the expected financial resources of the programme is presented below:

	2020./21.	2021./22.	2022./23.	2023./24.	2024./25.
Tuition fees per year, EUR	3990	4190	4390	4540	4760

Analysing the information provided, it can be concluded that the costs of the study programme are likely to increase, which is justified by the overall increase in RTU costs (utilities, building maintenance, etc.).

In order to ensure the quality of the study process, the number of students required for the programme is 20.

Information on the minimum number of students in RTU study programmes is provided in the appendix of the self-evaluation report "On minimal number of students in study programmes".

Information on the funding distribution between the cost items is provided in the appendix of the self-assessment report "Funding distribution between the cost items".

In addition, see:

- Provision of study facilities in Part II, Chapter 3, Section 2.3.1.
- Provision of research facilities in Part II, Chapter 3, Section 2.3.1.
- Provision of information facilities in Part II, Chapter 3, Section 2.3.3.
- Provision of the material and technical base in Part II, Chapter 3, Section 2.3.2.

Provision of the financial basis in Part II, Chapter 3, Section 2.3.1.

3.4. Teaching Staff

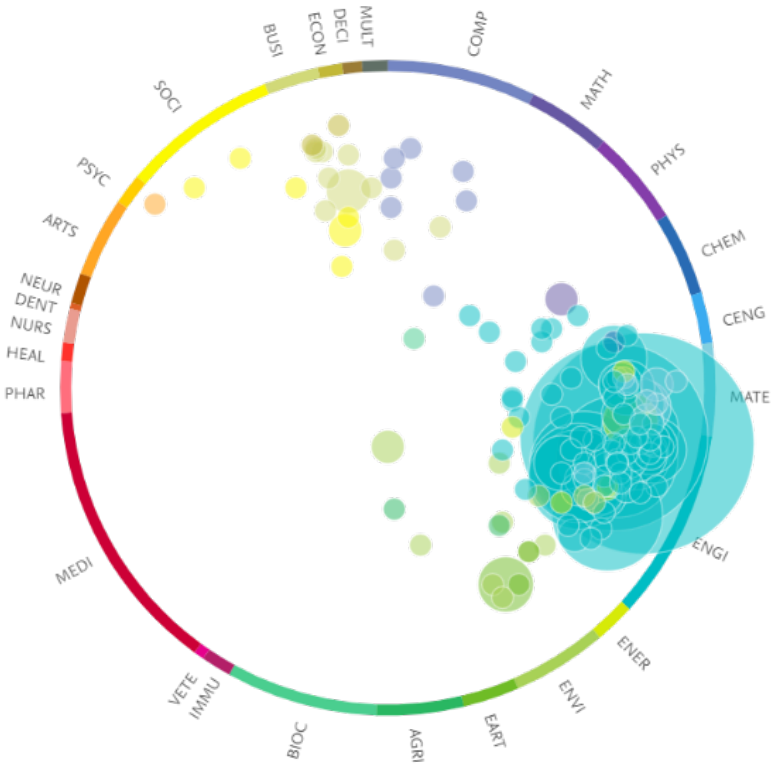
3.4.1. Assessment of the compliance of the qualification of the teaching staff members (academic staff members, visiting professors, visiting associate professors, visiting docents, visiting lecturers, and visiting assistants) involved in the implementation of the study programme with the conditions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

General evaluation of the academic staff is provided by the information and CVs of the members of academic staff given in the study field report Criteria 3.3.5.-3.3.6. of Part II, Section 3. At this point, compliance of the qualifications and competencies of the involved academic staff to the requirements of the study course is considered.

The following qualitative and quantitative indicators show that the qualifications of the academic staff meet the requirements specified in Article 55 of the Law on Higher Education Institutions - 13 professors and 7 associate professors, approved by the Latvian Council of Science, have been elected to academic positions in RTU departments and are experts in their field, participate in the implementation of the compulsory and the compulsory elective part of the study programme.

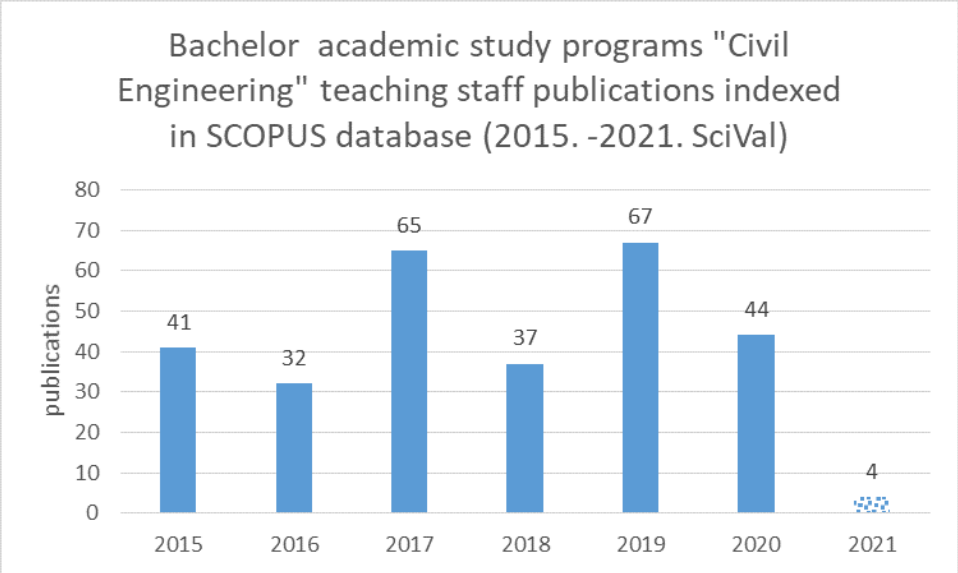
Academic staff regularly improve their professional and academic knowledge by participating in methodological seminars, conferences (national and international), conducting scientific and research work, as well as by participating in various projects.

The figure below shows the range of 290 publications by the faculty members of the Bachelor's degree programme "Civil Engineering", covering 146 thematic areas (80 thematic clusters).



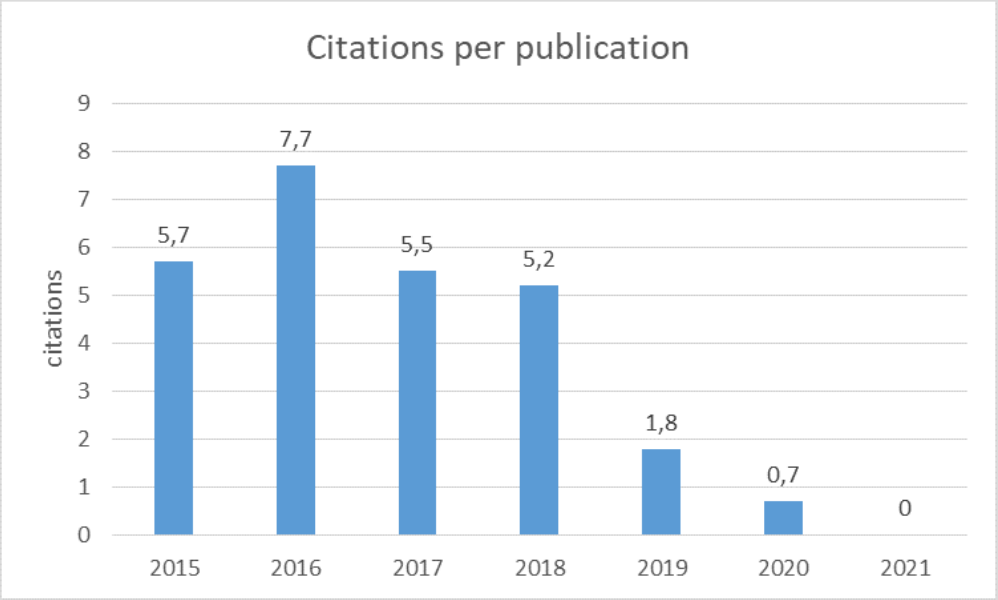
COMP	Computer Science	MEDI	Medicine
MATH	Mathematics	PHAR	Pharmacology, Toxicology
PHYS	Physics and Astronomy	HEAL	Health Professions
CHEM	Chemistry	NURS	Nursing
CENG	Chemical Engineering	DENT	Dentistry
MATE	Materials Science	NEUR	Neuroscience
ENGI	Engineering	ARTS	Arts and Humanities
ENER	Energy	PSYC	Psychology
ENVI	Environmental Science	SOCI	Social Sciences
EART	Earth and Planetary Sciences	BUSI	Business, Management and Accounting
AGRI	Agricultural and Biological Sciences	ECON	Economics, Econometrics and Finance
BIOC	Biochemistry, Genetics	DECI	Decision Sciences
IMMU	Immunology and Microbiology	MULT	Multidisciplinary
VETE	Veterinary		

Contribution of SCOPUS-indexed publications (in 2015-2021; data for 2021 are incomplete) by teaching staff to the development of thematic clusters (data from SciVal tool).



Based on the SciVal tool data, the main areas in which the academic staff of the Bachelor study programme "Civil Engineering" published SCOPUS indexed articles in 2015-2021 (290 publications in total) are Engineering (34.5%), Materials Science (19.7%) and Environmental Sciences (9.0%).

In the period from 2015-2021, 290 publications of the academic staff involved in the implementation of the study program have been cited 1,179 times, on average 4.1 citations per 1 publication. See the change in the number of citations in the graph below.



14.1% of publications are among the top 10% most cited worldwide and 9.3% of scientific articles are published in CiteScore top 10% journals.

The Department of Building Structures unites **11** academic staff members, including **3** professors, **2** associate professors, **5** assistant professors and **1** lecturer.

For example, Professor **Leonīds Pakrastiņš** is the author of more than 100 scientific publications and learning aids, and has presented papers at more than 50 international conferences. He is the supervisor of several Doctoral, Master's, Bachelor's and Engineer's theses. Expert of the Latvian Council of Science in the fields of Civil Engineering, Transport and Traffic. He has an extensive experience in preparing and conducting lectures and training courses. As the head of the technical committee LVS TC30 "Construction", he has organized the execution of the national implementation plan of Eurocodes standards and the development of national annexes, as well as the improvement of the technical regulation in the field of building structures. He holds European Commission JRC Centre instructor training certificates for EC2 and EC6 Eurocodes. Participant and manager of several national and international projects. Member of many conference programme committees and editorial boards of international journals. Member of the RTU Senate, expert of the Doctoral Council "RTU P-06". He has been awarded the titles of RTU Professor and RTU Honorary Employee for outstanding pedagogical and scientific activity.

Professor **Dmitrijs Serdjuks** has participated in more than 60 international conferences and published more than 100 scientific and methodological papers. He is an expert of the Latvian Council of Science in the field of Civil Engineering. He is currently leading the research project "Method of correlation of coaxial accelerations in 6-D space for quality assessment of structural joints (COACCEL)" funded by the Latvian Council of Science, has participated in the international mobility programme "Visiting Professors Program, Peter the Great St. He has also participated in the International Visiting Professor Program at St. Petersburg Polytechnic University. Teaching, research, scientific activity and collaboration. 2019 - 2020". He has been awarded the titles of RTU Professor and RTU Honorary Employee for many years of conscientious and active work at the University.

At the Department of Construction Mechanics, there are **4** academic staff members involved in the implementation of study courses, including **1** associate professor, **1** senior researcher, **1** assistant professor and **1** lecturer.

Associate Professor **Jānis Šliseris** has co-authored more than 45 scientific publications and presented papers at more than 30 international conferences. He spent two years as a research

fellow at the Fraunhofer Institute for Industrial Mathematics in Germany. Supervisor of Doctoral, Master's, Bachelor's and Engineer's theses. Expert of the Latvian Council of Science in Construction and Transport Engineering. Leader and chief executor of the international project ERANET ELAC2015/T02-0721 "Development of ecofriendly composite materials based on geopolymer matrix and reinforced with waste fibers". Participated in several RTU, LCS and international (ERDF, ESF) scientific projects, the scientific results of which have been published in international journals and conference proceedings, co-author of 3 patents. The construction material developed by J. Šlisers and his team won the first prize at the International Invention and Innovation Exhibition MINOX. He was awarded the honorary title "RTU Young Scientist of the Year 2017" for outstanding scientific activity.

At **the Department of Computer Aided Engineering Graphics,** there are **4** teaching staff members, **1** academic, **1** assistant professor, **1** practical assistant professor and **1** lecturer.

The academic staff of the department has organized four international conferences on the topics of the courses taught by the department. All academic staff of the department has scientific publications, incl. SCOPUS quoted, on the issues related to the implemented study courses. All faculty members have obtained certificates of competency for CAD software taught to students.

Professor **Modris Dobelis** has nearly 2.5 years of practical experience at Westinghouse Electric Corp. (USA) in the development of AP600 nuclear power plant project as a trainee/CAD engineer, practicing 3D modelling of piping systems and equipment, isometric schemes and drawings. As a Fulbright Teaching/Research Fellow, **M. Dobelis** has organised and led an international education and research project on the development of a quantitative assessment method for engineering graphics literacy with academic staff from 5 technical universities in 4 countries and hands-on involvement of about 100 students in the research. He has supervised two Master Theses on BIM related topics, and has been the supervisor of a six-month post-doc study and research project for tenure track candidate Silvia Titotto from the Federal University of ABC, Brazil. **Modris Dobelis** is a Corporate Researcher at the Graphics Literacy Education and Research Centre of the Faculty of Engineering of Kobe University, Japan, which organizes international collaborations in the field of engineering graphics, is an editorial board member of SciELO: Brazilian Archives of Biology and Technology Instituto de Tecnologia do Paraná - Tecpar, Brazil, is an article reviewer for "The Journal Biuletyn of Polish Society for Geometry and Engineering", Poland, and "Engineering Review" University of Rijeka, Croatia. **Modris Dobelis** is a member of several international societies, e.g., Honorary Member of Alpha Pi Chapter North Carolina State University, the Board of Directors of Epsilon Pi Tau of the International Honor Society for Professions in Technology. He has participated in ERASMUS mobility activities at three Serbian universities and the University of Moratuwa, Sri Lanka. He holds a certificate in English at C1 level. He has obtained an international Certified SolidWorks Associate (CSWA) level certificate for the CAD software taught in the course. **M. Dobelis** regularly lectures to foreign students of RTU Summer School in Robotics. During the last six years he has participated in 6 conferences and published 16 scientific articles on the issues related to the delivered study courses.

Assistant Professor **Zoja Veide** has participated as a researcher in the international mobility programme "Development of Cooperation between Baltic Universities and Kobe University in the Field of Graphic Sciences" (funded by the Ministry of Education of Japan), as well as in the ERASMUS+ projects "Development of Interactive and Animated Drawing Learning Tools" and "Modern Method for Spatial Awareness with Augmented Reality Technology" (Senior Expert, Scientific Supervisor). In the last six years, she has participated in 18 conferences and published 6 scientific articles on the issues related to the delivered study courses.

Lecturer **Veronika Stroževa** has worked as a researcher on the implementation of augmented

reality in teaching. She has participated in ERASMUS+ projects "Development of interactive and animated drawing teaching aids" and "Modern method for spatial awareness development using augmented reality technology". Within the project, she gave a public lecture "Educational Applications of Augmented Reality", as well as organised an online lecture "Online Lecture from Japan to Latvia" for students of Engineering High School of Riga Technical University and Riga Secondary School No. 40. In the last six years, she has participated in 11 conferences and published 6 scientific articles. She has a certificate of the right to perform pedagogical activity.

The Department of Civil Engineering unites **11** academic staff members, **1** associate professor, **4** assistant professors, **3** lecturers, **1** assistant and **2** research assistants. Academic staff regularly improve their professional and academic knowledge at methodological seminars, conferences (national and international), scientific and research work, as well as by participating in various projects.

In November 2020, the members of the Department of Civil Engineering, together with participants from Lithuania, Estonia and Finland, launched the project Virstem - Virtual technology for use in STEM, initiated by Tallinn Technical University (Tallinna Tehnikakõrgkool). The aim of the project is to develop an interactive Engineering Graphics course within two years, which will be freely accessible to all civil engineering students.

In the framework of the Digitisation in Construction Conference, the Department of Civil Engineering faculty members Kārlis Kostjukovs, Kristaps Ritvars Ronis and Raivo Kalderauskis organised a "Digital Construction Education Day" to explore the current situation at Latvian higher education institutions to support and promote digitisation in construction. The main guest was Professor Lamine Mahdjoubi from the University of the West of England, who has established a Master's degree programme in BIM at his university.

Kārlis Kostjukovs, Head of the Department of Civil Engineering, participated in exchange with the University of the West of England to gain knowledge about the implementation of Building Information Modelling (BIM) in the UK and its integration into the university environment. Kārlis Kostjukovs has been recognised as FCE Faculty Member of the Year 2018 and FCE Active Faculty Member of the Year 2018.

At **the Department of Construction Production,** 8 academic staff members are involved in the implementation of the study courses, including **2** professors, **2** associate professor, **2** assistant professors, **1** senior researcher and **1** researcher.

Professor **Mārtiņš Vilnītis** is actively involved in the work of the Latvian Association of Civil Engineers as the Head of the Education Section and also a member of the Board since 2015. In 2018 and 2019, he organised an international summer school "Sustainable Construction" in Riga and in 2020 he participated in the organisation of the 1st International Symposium on Sustainable Construction. From 14 January to 29 May 2020, Professor Vilnītis acquired new skills at professional development courses organised by CMB Engineering Competence Centre Ltd. During the training, he acquired knowledge on fire safety solutions for buildings, building management systems, building physics, modern technologies for various construction works, energy efficiency requirements, LVS standards, technical inspection and building supervision.

In 2021, with the support of the ESF project "Strengthening of academic personnel of higher education institutions in strategic specialisation areas ", FCE have recruited a visiting professor from the University of Salerno, **Michele Guida**, who has developed and is delivering the lecture course on "Radon Assessment and Management for Civil Engineering" specifically for FCE students.

Associate Professor **Baiba Gaujēna** has co-authored 19 scientific publications, participated in several scientific and international conferences, is the Head of the study programme "Civil

Engineering", as well as is the member of the State Examination Committee for the final theses of the Faculty of Civil Engineering of RTU. She is a supervisor of final theses for students of different levels - Master's and Bachelor's with engineering project part of the programme. In 2018, she received the FCE Student Recognition Award "Student Support 2018".

At **the Department of Composite Materials and Structures,** there are 4 academic staff members, **2** professors, **1** assistant professor and **1** lecturer.

For example, Professors **Andris Čate** and **Jevgenijs Barkanovs** are Corresponding Members of the Latvian Academy of Sciences and actively participate in the work of the Department of Physical and Technical Sciences.

Professor **Jevgenijs Barkanovs** has participated in more than 30 international conferences and published 70 scientific articles (Hirsch citation index - 13). He is a member of the editorial boards of several international scientific journals and has lectured as a visiting professor at universities in both European and Asian countries. Professor Evgeny Barkanov has led several national projects (ERDF, ESF) as well as international projects (EU Framework Programme). He has received several RTU awards for outstanding achievements in science, teaching and organisational work.

At **the Department of Building Materials and Building Products, 11** academic staff members are involved in the implementation of study courses, including **2** professors, **1** associate professor, **4** assistant professors, **1** senior researcher and **1** researcher.

For example, Professor **Diāna Bajāre** is currently leading 3 research projects (2 national and one international) on the development of innovative construction materials and, in collaboration with SIA Sakret, she is developing 3D concrete printing technologies. She has participated in two international study/ teaching material development projects (H20H20, Erasmus +); participates in several international networking events and projects. In the last 5 years, she has presented papers at more than 10 conferences and published more than 45 scientific articles cited in Scopus database (H-index 16). She is currently a guest editor for several scientific journals and reviews about 10 scientific articles per year. At the same time, she supervises PhD Theses and peer-reviewed dissertations both in Latvia and abroad.

Professor **Aleksandrs Korjakins** received the honorary title "RTU Scientist of the Year 2019", certificates of recognition for many years of qualified training of young specialists and scientific work, a certificate for mastering the English language programme and B1 (intermediate) level compliance, and has regularly participated in seminars and advanced training courses. He has participated in 7 COST projects, as well as national and international projects such as ERDF, LCS and ESF funded projects, published a total of 10 patents and more than 180 scientific articles, of which 88 are indexed in SCOPUS and/or Web of Science, with a current h-index of 16. He has participated in more than 50 scientific conferences and in the Erasmus+ international mobility programme, with exchange visits to Vilnius Gediminas Technical University, Lithuania, University of Malta, Malta, University of Structural Engineering & Architecture (VSU) "Lyuben Karavelov, Bulgaria.

Assoc. Professor **Genādijs Šahmeko** has received a Certificate of Appreciation for many years of qualified training of young specialists and scientific work, a Certificate of English language programme and B2 (intermediate) level compliance, has regularly participated in seminars and advanced training courses. He has published a total of 8 patents and more than 100 scientific articles, including more than 20 scientific articles indexed in Web of Science and/or Scopus databases in the last 3 years. He has participated in more than 40 scientific conferences and in Erasmus+ international mobility programme, with exchange visits to Vilnius Gediminas Technical University, Technical University of Dresden, Tallinn Technical University. (He has organised conferences of the Latvian Concrete Union and represents RTU on the Board of the Concrete Union).

Assistant professor **Ģirts Būmanis** was awarded a title of RTU young researcher of the year 2021, participated in more than 10 conferences and published 43 scientific articles indexed in SCOPUS database and current h-index 9 with 305 citings. Ģ. Būmanis received a PostDoc grant from 2018 to 2020 and participates in state and international projects, such as ERDF, LCS and ESF projects. Ģ. Būmanis participated in international scientific partnership projects, such as COST action, has done research at research institutes of Estonia, Lithuania, Portugal and Slovenia. Ģ. Būmanis has a building inspector certificate, as well as a good experience in lecturing and supervision of student theses. Has been a supervisor of two Bachelor Papers, one Master Thesis and one international Master Thesis. Currently, he is a scientific supervisor of one PhD Thesis. His research interests are related to alternative binding substances, alkali activated materials, plasters, waste recycling, biocomposites and high-strength concrete.

The above information on each of the faculty academic staff, as well as the faculty academic staffs' biographies, demonstrate their high level of qualification and their ability to ensure the quality of the stage courses and the quality of the programme as a whole. Many of the lecturers are also active in the construction industry, which also helps to translate their practical knowledge and competences into achieving the objectives of the programme. The programme's academic staff contribute to the achievement of the learning outcomes through their qualifications and their knowledge and skills.

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

RTU scientific and academic personnel with Doctoral degrees will be involved in the implementation of the **Academic Bachelor Study Programme "Civil Engineering"** - 34 Doctors of Science, each of whom is an expert in their field. The scientists and young scientists involved in the implementation of the study programme specialise in the field of civil engineering. The rationale for the selection of the academic staff is related to the scientists' experience, research interests, scientific performance, etc., taking into account the specificities of the study programme and the study courses. In accordance with the objectives of the study programme, the primary criteria for the selection of academic staff are knowledge of the latest developments and participation in scientific and research projects in their fields, pedagogical skills in line with current trends in their field and experience in teaching courses to foreign students in English.

If necessary, lecturers from partner universities abroad will be involved in the implementation of the study programme, industry professionals will also be invited to deliver practical lectures.

For a more detailed list of all faculty members who will be involved in the implementation of the study programme, please see the table and their creative and scientific biographies (CVs) in Annex 11, as well as see the list of publications by faculty members related to the study programme in peer-reviewed journals or research and artistic achievements in the last six years.

Currently, RTU is implementing a SAM 8.2.2 project on "Strengthening of Academic Personnel of Riga Technical University in Strategic Specialisation Areas" financed by the European Social Fund, one of the tasks of which is the renewal of academic personnel. The aim of the project is to strengthen RTU academic personnel in the areas of strategic specialisation in 10 study fields, including the study field "Architecture and Civil Engineering". The project activities are focused on three areas:

- Involvement of Doctoral students in the work of the academic staff at RTU,
- Involvement of foreign academic staff in the work of the academic staff at RTU,
- Improvement of the existing academic staff qualifications, including academic staff internship at an economic operator.

Within the project, academic staff have an opportunity to develop their competence at the courses in professional English, as well as specialized training courses.

In order to ensure and increase the impact of scientific activities and personnel development, RTU management signs an annual agreement with each RTU faculty, which sets specific quantitative indicators in the areas of studies, scientific activities and valorisation.

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

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

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

In the process of study programme implementation, close cooperation of academic staff takes place, which is also manifested in the following activities:

1) Discussion of the results and quality of the reviews at the department meeting, discussing the evaluation criteria and ways to improve the quality of the graduate papers.

2) Interconnection of lectures and practical classes, discussion of strengths and weaknesses

afterwards.

3) Joint attendance of methodological seminars, which are held in an interactive way, where academic staff share their experience and discuss the latest scientific and professional trends, as well as psychological and pedagogical techniques and methods for improving the study process.

4) Cooperation within the projects, where the experience gained is used by the academic staff in the study process.

5) Joint study tours, where academic staff and students learn about current developments in the field and apply practical case studies in classroom sessions.

The student-faculty ratio at the study programme at the time of submission of the self-evaluation report is 100/20, or one faculty member per 5 students (the forecasted number of students).

Annexes

III - Description of the Study Programme - 3.1. Indicators Describing the Study Programme		
Sample of the diploma and its supplement to be issued for completing the study programme	RBBB0.zip	RBBB0.zip
For academic study programmes - Opinion of the Council of Higher Education in accordance with Section 55, Paragraph two of the Law on Higher Education Institutions (if applicable)	AIP Conclusion - Civil Engineering - 02000-2.1.1_25.pdf	AIP atzinums - Būvniecība - 02000-2.1.1_25.pdf
Compliance of the joint study programme with the provisions of the Law on Higher Education Institutions (table) (if applicable)		
Statistics on the students in the reporting period	Annex 5.pdf	5. pielikums.pdf
III - Description of the Study Programme - 3.2. The Content of Studies and Implementation Thereof		
Compliance with the study programme with the State Education Standard	Annex 6.pdf	6. pielikums.pdf
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard or the requirements for professional qualification (if applicable)		
Compliance of the study programme with the specific regulatory framework applicable to the relevant field (if applicable)		
Mapping of the study courses/ modules for the achievement of the learning outcomes of the study programme	Annex 8.pdf	8. pielikums.pdf
The curriculum of the study programme (for each type and form of the implementation of the study programme)	Annex 9.pdf	9. pielikums.pdf
Descriptions of the study courses/ modules	BBB0_EN.zip	BBB0_LV.zip
Description of the organisation of the internship of the students (if applicable)		
III - Description of the Study Programme - 3.4. Teaching Staff		
Confirmation that the academic staff of the doctoral study programme includes not less than five doctors, of which at least three are experts approved by the Latvian Council of Science in the branch or sub-branch of science in which the study programme intends to award a scientific degree (if applicable)		
Confirmation that the academic staff of the academic study programme complies with the requirements specified in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions (if applicable)	Confirmation - on compliance of the academic staff.edoc	Apliecinājums - AL 55. pants par prof. skaitu akadēmiskās programmās.edoc