

APPLICATION

Study field "Mechanics and Metal Processing, Heat Power Engineering, Heat Technology, and Mechanical Engineering" for assessment

Study field	<i>Mechanics and Metal Processing, Heat Power Engineering, Heat Technology, and Mechanical Engineering</i>
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Self-evaluation report

Study field "Mechanics and Metal Processing, Heat Power Engineering, Heat Technology, and Mechanical Engineering"

Latvia University of Life Sciences and Technologies

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I - Information on the Higher Education Institution/College

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

Latvia University of Life Sciences and Technologies (LLU) is the fourth largest university in Latvia (established in 1936 as an independent higher education institution) which implements studies and research for various industries of the national economy and which has developed relevant educational and research competence and expertise in:

- the following unique fields: agriculture, forestry, veterinary medicine, food technology and landscape architecture;
- the following universal fields: information technology, economics and social sciences, agricultural engineering, environmental sciences, civil engineering and pedagogy.

LLU vision - Latvia University of Life Sciences and Technologies is one of the leading science and technology universities of the Baltic Sea region, with a specialisation in the sustainable use of natural resources to improve the life quality of society.

LLU mission - to build internationally competitive intellectual potential based on excellence in research, application of research results in the national economy, high quality of studies and effective university management.

LLU long-term goals:

1. Excellence in research that promotes technology and innovation and is integrated into the study process.
2. High-quality studies that provide the development of internationally competitive specialists.
3. Effective university management that ensures the targeted and efficient use of resources for high-quality studies and excellence-focused research.

LLU medium-term objectives are subordinated to the vision, the mission and the long-term goals and are as follows:

1. Excellence in research.
2. Application of research results in the national economy (research results are understood to mean the university's knowledge, technology and innovation accumulated and generated).
3. Integration of studies and research.
4. Internationalisation of studies and lifelong education.
5. High quality and competitive studies that meet the current demand.
6. Diversified supply of lifelong education that meets the current demand.
7. Effective university management at all the levels.

The LLU Development Strategy for 2015-2022 (<https://www.llu.lv/index.php/en/mission-and-vision>) prescribes three action programmes with relevant targets to achieve the long-term goals:

1. Research Programme;
2. Education Programme;
3. Management Programme.

LLU is comprised of the following eight faculties:

1. **LF** - the Faculty of Agriculture (established in 1863);

2. **VMF** – the Faculty of Veterinary Medicine (established in 1919);
3. **MF** – the Forest Faculty (established in 1920);
4. **TF** – the Faculty of Engineering (established in 1944);
5. **VBF** – the Faculty of Environment and Civil Engineering (established in 1947);
6. **PTF** – the Faculty of Food Technology (established in 1948);
7. **ESAF** – the Faculty of Economics and Social Development (established in 1968 as the Faculty of Agricultural Economics; in 2013, the Faculty of Economics merged with the Faculty of Social Sciences);
8. **ITF** – the Faculty of Information Technologies (established in 2001).

Totally, the Faculties of LLU implement 61 study programmes within **14** study directions (as of October 1, 2020).

Table 1.1

Number of students and programmes in LLU study directions

B – bachelor programmes; M – master programmes; D – doctoral programmes

No.	Study direction	Number of programmes				Number of students (01/10/2020)	Faculties
		Total	B	M	D		
1	Agriculture, Forestry, Fishery, and Food Hygiene	12	6	3	3	1,140	LF, MF, VMF
2	Architecture and civil engineering	9	5	2	2	434	VBF
3	Production and processing	8	4	2	2	443	PTF, MF, TF
4	Information technology, computer engineering, electronics, telecommunications, computer management and computer science	4	2	1	1	286	ITF
5	Environmental protection	3	1	1	1	98	VBF
6	Health care – a joint programme with LU and RSU	1		1		22	PTF
7	Mechanics and metal working, heat power engineering, heat engineering and mechanical engineering	6	4	1	1	272	TF
8	Power industry, electrical engineering and electrical technologies	1	1			85	TF

No	Study direction	Number of programmes				Number of students (01/10/2020)	Faculties
		Total	B	M	D		
9	Sociology, Political Science, and Anthropology	2	1	1		68	ESAF
10	Economics	3	1	1	1	389	ESAF
11	Management, administration and real estate management	5	2	3		342	ESAF
12	Hotel and restaurant service, tourism and recreation organisation	1	1			141	PTF
13	Internal security and civil defence	1		1		53	MF
14	Education, pedagogy and sports - the direction to be closed in 2023	5	2	2	1	118	TF
Total		61	30	17	12	3,891	

LLU personnel, job positions and age group statistics information are in the table.

Table 1.2

LLU personnel, job position and age group statistics (as of October 1, 2020)

	Total	incl. women
University personnel	957	652
incl. academic staff members who have been elected at LLU	305	190
professors	57	33
associate professors	53	36
assistant professors	64	47
lecturers	40	30
assistants	0	0
leading researchers and researchers	91	44

Academic staff members – professors, associate professors, assistant professors, lecturers or assistants – who are also elected as leading researchers and researchers	156	105
Other personnel	652	462
Academic staff who have not been elected at LLU (visiting professors, visiting assistant professors, visiting lecturers)	253	153
of which foreign visiting professors, visiting assistant professors, visiting lecturers	21	4
Distribution of <i>academic staff members</i> by age:		
under 25 years	0	0
25-29 years	4	3
30-34 years	21	12
35-39 years	49	24
40-44 years	39	28
45-49 years	46	32
50-54 years	30	24
55-59 years	31	23
60-64 years	41	26
65 years and over	44	18

227 members of the total academic staff have a scientific degree (74.43%).

LLU promotes and supports the engagement of young teaching staff in academic work. Of the current academic staff, 52% are less than 50 years old, 33% are from 50 to 65 years old and only 14% are over 65 years old.

Changes in the number of students at LLU. In the period from the academic year 2013/2014 to the academic year 2020/2021, the total number of students accounted for more than 4,000. The decrease in the number of students over the six-year period reflects overall negative demographic trends concerning natural increase of population and migration. The total number of students at LLU decreased by 18% over the six-year period, yet a positive fact is that the number of students tends to remain stable in last years. Overall, the total number of students was affected by the processes occurring in the country: 1) the number of individuals who finished the secondary school decreased by 20% in the reference period; 2) the number of individuals who finished their secondary school and continued their education at university was very volatile from year to year: a 5% decrease in 2015 and 2017 and a 1-2% increase in 2014 and 2018. Currently (in 2020), the number of students has levelled off, and there has even been a slight increase in the total number of students studying at LLU compared with the previous year.

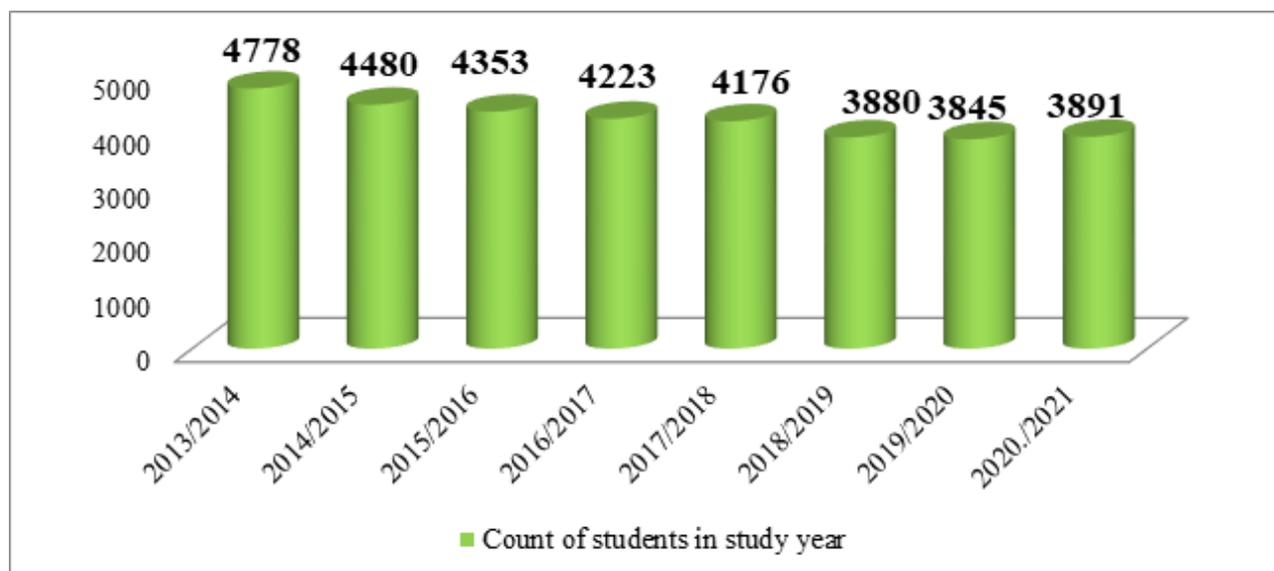


Fig. 1.1. **Changes in the number of students at LLU in the period 2013-2020** (October 1 of each year)

After the university had succeeded in tackling with the external factors affecting the number of students, a number of reasons for the decrease in the number of students were established; the reasons were identified from the analysis of the matriculation of students.

The major reasons are as follows:

1. There was a considerable increase in the amount of students who discontinued their studies during the first semesters owing to the wrong study programme or study direction chosen, their jobs or private life problems;
2. Some students could not continue their studies because of financial problems or due to the schedule requirements (especially working part-time students), since they could not combine studies with their working hours;
3. Master's degree students were unable to combine studies with their jobs;
4. Interest in doctoral studies tended to decrease because financial support for doctoral students was insufficient (a monthly scholarship determined by the state was EUR 113.83), and the availability of funding for research was limited.

The distribution of the number of students by level of studies at LLU in the reference period was as follows:

1. Bachelor's degree studies - 79-84%;
2. Master's degree studies - 13-17%;
3. Doctoral studies - 4%.

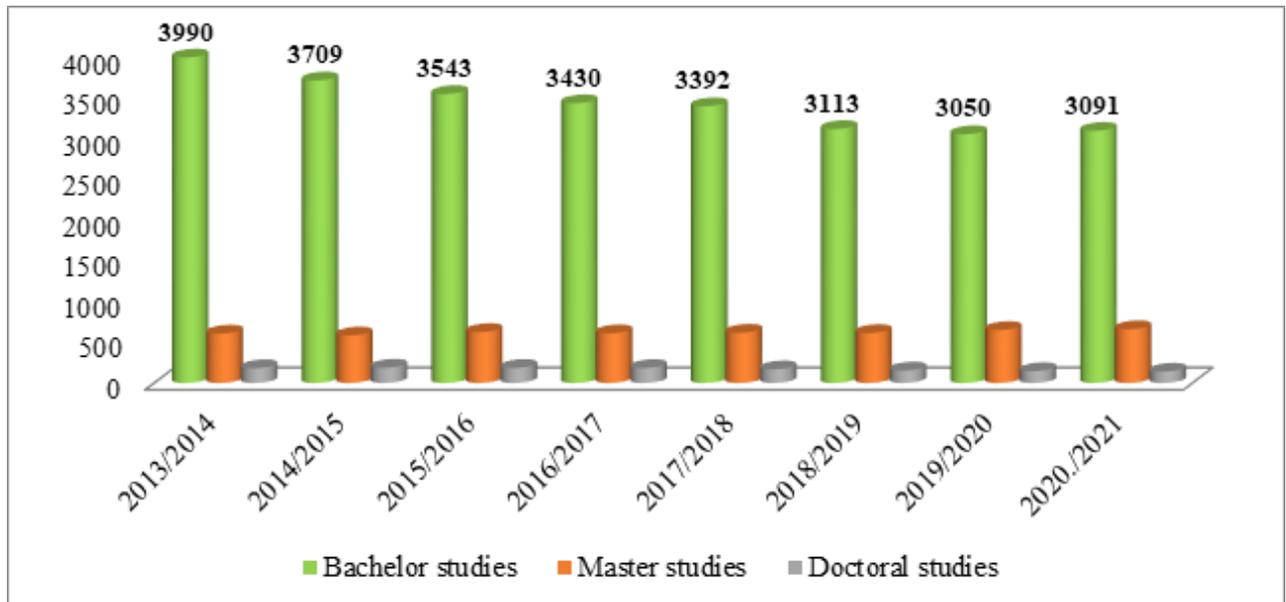


Fig. 1.2. **The distribution of the number of students by level of studies at LLU**

The analysis of changes in the number of students distributed by level of studies allows concluding that the numbers of undergraduate and doctoral students were the most volatile (a negative trend). The decrease in the number of undergraduate students could be rationally explained as follows: over the six-year period, several study programmes were consolidated; the regional affiliates of LLU were closed; the decrease in numbers of part-time students was observed in particular. The decrease in the number of doctoral students could be explained by the insufficient amount of funding allocated to science and research as well as the fragmented nature of that funding.

Main activities implemented by LLU to increase its number of students:

1. In the academic year 2015/2016, LLU began admitting international students for studying in English. Thus 161 international students studied at LLU in 11 study programmes (at all the levels of studies) in the academic year 2020/2021.

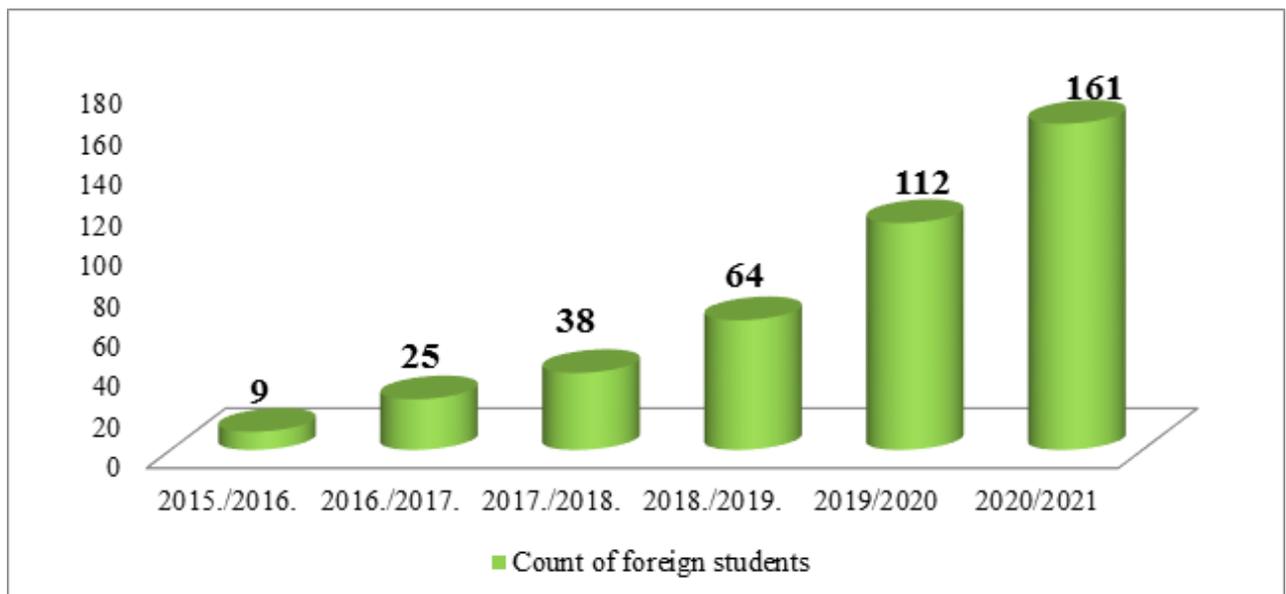


Fig. 1.3. **Number of international students studying in English**

2. Students are given an opportunity to acquire a bachelor's degree of social sciences in sociology in the form of e-studies.
3. As regards the conventional study process, teaching staff members use the Moodle online

system intensively as a support tool for e-studies (learning materials, multiple choice tests, tests, homework etc.).

4. Infrastructure for studies and research has been improved and modernised.

5. Opportunities to receive scholarships funded by patrons tend to increase.

6. LLU provides doctoral students with internal research grants.

Research activities and motivation measures for the academic staff are defined in the LLU Development Strategy, the relevant targets set have to be achieved by the Faculties, administrative centres and scientific institutes and laboratories. Each organisational unit of LLU approves these plans for an annual period. The decision-making bodies of the organisational units have to approve the targets set and the procedure to achieve the targets. Each organisational unit collegially reports on the progress to the LLU Rectorate, and the details of the implementation of the plans are published on the LLU intranet: <https://mans.llu.lv/lv>, they and are available to the academic staff and students.

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

The following key (collegial) institutions are involved in making **strategic decisions** at LLU:

The **Council** is a supreme collegial representation, management and decision-making body for academic and scientific matters authorised by the personnel of LLU.

The **Council**:

- approves and amends the Constitution of LLU;
- elects and dismisses the members of the Senate of LLU;
- elects and dismisses the rector of LLU;
- elects the Academic Arbitration Court of LLU and dismisses its members;
- hears reports by the Senate, the Rector and the Academic Arbitration Court;
- approves and amends regulations on electing the Council, electing and dismissing the Rector and the statutes of the Senate and the Academic Arbitration Court;
- discusses and makes decisions on conceptual matters on the performance and development of LLU.

The Council is composed of 240 members who are elected by the organisational units of LLU by secret ballot for three-year terms in the following composition:

- 160 academic staff (66.7%);
- 50 students (20.8%);
- 30 other personnel (12.5%).

The Council functions in accordance with its Statute.

The **Senate** is a collegial management and decision-making body of the personnel of LLU, which approves the rules and regulations that govern all the spheres of LLU activity, with the exception of

those that fall within the remit of the Council in accordance with the Constitution of LLU.

The Senate is approved by the Council for a period of three years. The Senate consists of 60 senators, of which:

- 41 are representatives of academic staff who represent all the Faculties (68%);
- one representative of other personnel (2%);
- the Rector of LLU, the Vice-Rectors for studies and science and the chair of the Council as representatives of academic personnel, the director and the Chancellor of LLU as representatives of other personnel (10%);
- 12 representatives of students who have been nominated by the Student Self-government (20%).

The Senate functions in accordance with its Statute.

Regulations, decisions and procedures in relation to the matters pertaining to the basic activity of LLU are also passed, within the scope of competence, by:

1. Rector;
2. Vice-Rectors for studies and science;
3. Chancellor;
4. Director;
5. Deans of the Faculties

Annex 1 - List of main internal documents of LLU.

Annex 2 - LLU Management Structure.

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

Quality management system at the University

The quality management of study processes is part of the overall quality management system of LLU. Since 2016, the quality management system of LLU has been based on the international standards for excellence (see Investors in Excellence Standard, www.investorsinexcellence.com). The quality management system of LLU is externally audited every two years (audits may be done by the organisations recognised by the Investors in Excellence organisation, which either grant or do not grant an Investors in Excellence certificate to the organisation audited). Such a certificate was granted to LLU both in 2016 (the first audit) and in 2018 (the repeated audit). In December 2020, LLU was recertified for the second time and currently its operation is accredited according to this standard until December 2022. The quality management system of LLU is part of the overall LLU Development Strategy and covers a broad spectrum of matters. A short general description of the LLU Quality Management System, Quality management system policy and the Quality Assurance Plan is available at <https://www.llu.lv/index.php/en/mission-and-vision> (document "Quality Management System description and assurance plan").

Quality management system in the context of studies

LLU has developed a detailed joint scheme of study processes that includes 90 major study processes, their sequence and interaction. Each of the 90 processes is described and arranged sequentially. The description contains the following parts: activities; responsible organisational units and employees; reference to the legislative or regulatory framework governing the activities. The detailed joint scheme of study processes provides a common approach to study processes across all the organisational units.

The descriptions of quality of studies at LLU are restricted access documents and are intended for internal use at LLU as well as are part of the management and strategic documents of LLU. The detailed information on the internal quality management system and its effectiveness is contained in Section 2.2 of the self-assessment report where the quality management system is described, assessed and defined in the context of a particular study direction.

The characteristics of stakeholders and their role in the development and improvement of quality assurance system

The quality management system of LLU covers all the spheres of LLU activity. The academic staff and other personnel of LLU are involved in the quality management system. The coordinating body of the quality management system is the Administrative Centre of LLU, which is subordinate to the Rector.

1.4. Fill in the table on the compliance of the internal quality assurance system of the higher education institution/ college with the provisions of Section 5, Paragraph 21 of the Law on Institutions of Higher Education by providing a justification for the given statement. In addition, it is also possible to refer to the respective chapter of the Self-Assessment Report, where the provided information serves as evidence for the full compliance, partial compliance or non-compliance.

1.	The higher education institution/ college has established a policy and procedures for assuring the quality of higher education.	Complies
		Investor in Excellence certificate issued in 2016. Detailed information is provided in Section 1.3 and 2.1 of the report.

2	<p>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.</p>	<p>Complies</p> <p>New study programmes are developed in accordance with the Regulation on Study programme Development, Approval and Amendment at LLU (No. 10-5 as of 13 March 2019) approved by the Senate.</p> <p>The Regulation stipulates that:</p> <ol style="list-style-type: none"> 1. A programme shall be developed by a Faculty, discussed by the Methodological Commission of the Faculty and approved by the Board of the Faculty; 2. The programme developed shall be discussed by the Board of Studies and recommended for approval by the Senate; 3. The Senate shall approve the programme and a director for the programme; 4. Relevant documents shall be submitted to the Academic Information Centre for being licensed; 5. New students shall be admitted to LLU and enrolled in the programme after the licence has been granted. <p>Every year, annual reports are drawn up for all study programmes; the reports are approved by the Senate and published on the LLU website https://www.llu.lv/lv/studiju-virzienu-parskati-un-pasnovertejuma-zinojumi (only in Latvian).</p>
3.	<p>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.</p>	<p>Complies</p> <p>The students' learning outcome assessment system is described in:</p> <ul style="list-style-type: none"> • Regulation of Studies (bachelor's and master's degree studies). • Regulation of Doctoral Studies. <p>The requirements for assessing students' learning outcomes for each particular course are given in the descriptions of course study programmes available in Latvian and English in the LLU IS course register at https://lais.llu.lv/pls/pub/kursi.startup?l=1</p>

4.	Internal procedures and mechanisms for assuring the qualifications of the academic staff and the work quality have been developed.	<p>Complies</p> <p>LLU has developed procedures and regulations (approved by the Senate) to guarantee the qualifications and work quality of academic staff:</p> <ol style="list-style-type: none"> 1. The LLU Regulations on Academic Positions (File No. 7 in the attachments section in the folder "Documents in English"). 2. The Regulation regarding the Calculation of Academic Workload (File No. 8 in the attachments section in the folder "Documents in English"). 3. The Motivation System for LLU Academic Staff (File No. 9 in the attachments section in the folder "Documents in English"). 4. Classes for students are scheduled in accordance with the procedures approved by the Rector: classes are scheduled in a centralised way for full-time studies, while for part-time studies it is done by each Faculty. The schedules are publicly available two weeks before the beginning of a semester (for part-time studies – before the beginning of the examination period).
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.	<p>Complies</p> <p>LLU uses an information system that aggregates information about the entire study process of each student (decisions regarding the student, grades earned, payments made). Every semester, a survey of students is conducted to find out students' opinion regarding the courses taken, satisfaction with the way the courses are organised, the content of the courses, the teaching staff delivering the courses (an electronic questionnaire). The survey results are available to each teaching staff member, directors of study programmes, department/institute directors, deans of the Faculties and the Vice-Rector for studies.</p> <p>For financial planning and accounting, LLU employs the accounting system Horizont that is a single system connected with the Ministry of Agriculture.</p> <p>The achievement of the goals and targets set by the LLU Development Strategy is reported each year at different levels:</p> <ul style="list-style-type: none"> Faculties – during the dean's office meetings; Administrative units – at the Board of Studies; The Vice-Rectors, the Chancellor and the LLU Director – during the Rectorate meetings; The Rector – during the Council meetings.

6	The higher education institution/ college shall ensure continuous improvement, development, and efficient performance of the study direction whilst implementing their quality assurance systems.	Complies Reports of the study directions are produced every year, reviewed by the Board of Studies and approved by the Senate. Once approved, the reports are made public on the LLU website - https://www.llu.lv/lv/studiju-virzienu-parskati-un-pasnovertejuma-zinojumi (Only in Latvian)
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II - Description of the Study Direction (1. Management of the Study Direction)

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

This study direction was launched in 1944 when the [Faculty](#) (only in Latvian) of Agricultural Mechanisation with one study programme *Mechanisation of Agriculture*, current sub-programme *Agricultural Machinery* of the Bachelor's study programme *Agricultural Engineering* (only in Latvian), was created in the Latvia [Academy of Agriculture](#). The first motor transport programme Motor Vehicles and Vehicle Management, current sub-programme *Motor Vehicles* in the Bachelor's study programme *Agricultural Engineering* was established in 1959. At initiative of the Latvian [Association](#) of Machine Building and Metal Processing, Professional Bachelor's study programme *Machine Design and Production (only in Latvian)* was licensed in 2006. At initiative of Ground Vehicle Sworn Experts of Latvian National [Association](#) (only in Latvian) the first level professional higher education study programme *Technical Expert* (only in Latvian) was licensed in 2009 (this program is planned to be closed, therefore it is not submitted for accreditation). The Bachelor's study programme *Biosystem Machinery and Technologies* was licensed and prepared within the framework of ESF [project](#) (only in Latvian) in 2020, and it was intended for delivery in English in order to attract foreign students. To certain extent it integrates the content of previously mentioned three Bachelor's programmes. All these undergraduate programmes are interrelated, and each of them cover certain aspect of engineering science and machinery. The mission of programme *Machine Design and Production*, as implied in the very title, is technological aspects of machine design and production, incl. also in sector of light vehicles and agricultural machinery. The mission of Bachelor's programme *Agricultural Engineering* is technical and technological aspects of operation and maintenance of both agricultural machinery and light vehicles. Thus, all these programmes in general cover rather wide aspects of machinery designing, production, operation, assessment of technical condition, technical maintenance and related costs.

Master's study programme was introduced in 1992, because there was a transition to two-level higher education in Latvia. The graduate programme allows previously mentioned undergraduate alumni continuing studies and developing their qualification.

[Doctoral](#) study programme is available since 1946 (former science candidate study programme). It is based on the Master's study programme and students who have graduated from the Master's studies only can continue scientific studies there.

All the mentioned programmes are original study programmes. These programmes have some analogy with programmes *Agricultural Engineering*, *Biosystem Engineering* of all three levels

offered in the Western countries.

Bachelor sub-programme *Motor Vehicles* has some similarities with Professional Bachelor's study programme (only in Latvian) delivered by RTU, and it also gives 180 credits (4.5 years) (Volume of TF programme *Motor Vehicles* – 160 credits – 4 years). Section of the Master's study programme *Motor Vehicles* has some similarity to Professional Master's study programme Vehicle Transport (only in Latvian) delivered by RTU, however the differences lie in the status (academic – professional) and volume (80 – 120 credits).

Along with development of Latvian economy, lack of engineers in various companies is more evident. Students who have chosen this direction are partially involved in production during their traineeship in the 3rd or 4th year, and they can start working for these companies right after defense of the Bachelor thesis. By ensuring one workplace of production engineer another 4 or 5 workplaces in service sector are created. Creating knowledge-intensive and intellectual team in the company provides benefit for both urban and rural social life. Latvia manufactures agricultural machinery, grain processing equipment and drying-kilns, rebuilds different vehicles, manufactures their parts – exhaust pipes and radiators, and LLU TF alumni work in many of these factories. Qualified specialists who understand modern technologies and eliminate problems as the equipments wear are necessary for distribution of produced machines and technical service. LLU TF alumni work also in these companies.

LLU study environment is chosen by many youth from countryside, hence the knowledge is transferred also to regions situated further away from Riga. Combining the knowledge, skills and competences obtained in their natural environment with those acquired in LLU, coins a specialist who understands rural setting and a need for development and keeping it for next generations.

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

The goal of study direction is to prepare highly qualified, internationally competitive, creative specialists with wide outlook in fields of mechanics, metal processing and machine building, who operate equipment, devices, design and manufacture machines, determine and maintain technical condition, utilisation, development, sale and repair, and who are also highly qualified international-level new scientists, entrepreneurs, specialists of public administration, local government and education.

Engineering Science is one of three bodies of science industry in LLU [Strategy](#). TF is in charge of energetics, electronics and telecommunication engineering science, machine science, material science, environmental engineering as well as other engineering sciences and technologies. Among LLU priority research directions, TF section mentions use of sustainable energy in motor vehicles; smart technologies and robotised biosystems; sourcing and use of renewable energy; reduction and rational use of manufacturing by-products and waste. These directions are described in more detail in the strategy.

Education programme's goals in LLU Strategy and attainment thereof include measures to enhance LLU capacity to prepare internationally competitive intellectual potential, especially in fields included in Latvian Smart Specialisation Strategy and promote LLU internationalisation by becoming internationally recognisable, renown and demanded provider of higher education (page 47). LLU

delivers higher education and lifelong education in scientific fields and economic sectors where it has accumulated education and research competences (see also information in Section 1.1). A special attention is paid to improvement of study programmes and extending the offered range, where the new specialists will be prepared in line with prospective bioeconomy fields within Latvian Smart Specialisation Strategy, i.e. agriculture (programme Agricultural Engineer of all three levels), forestry, ... energetics rooted in renewable energy.

In context of internationalization of education, LLU surveys and evaluates the demand – interests and needs of foreign students, prepares and promotes an offer satisfying this demand (*Biosystem Machinery and Technologies*) in international environment.

The Ministry of Economics [forecasts](#) (only in Latvian) that in 2027 demand for specialists with higher education in engineering sciences, manufacturing and construction is going to exceed the offer by 15% (p. 67) (difference will be 27% in [2025](#), p. 56), the forecast difference in agriculture will be 11% (page 69). Cabinet [Regulation](#) No. 108 of 20.02.2018 “Specialities (professions) with prognosticated significant lack of labour force ...” (only in Latvian) engineers of mechanics, design, vehicle design, diesel combustion motors, agriculture / mechanics, ground motor and vehicles / mechanics are also mentioned among such specialities.

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

Strengths

- High professionalism and pedagogic and scientific qualification of the academic staff;
- good and modern materially technical base of studies and research which is enriched systemically;
- individual approach to each student during individual work, consultations etc.
- good cooperation with industry’s companies which are used as a training platform for student traineeships and adding and updating materially technical base for studies.
- cooperation with employers in evaluating and improving the study programmes;
- active participation of lecturers in international scientific conferences and research activities;
- availability of good quality wi-fi internet in all premises of the faculty;
- availability of EU project funding (even though it is limited) to update and improve study and research environment;
- faculty’s cooperation with student self-government, to ensure publicity of various events organised by student self-government.

Weaknesses

- limited funding for higher education and science in Latvia;
- age structure of teaching and research staff and problem of renewal.
- international recognisability;

- large workload of academic staff and difficulties to conduct scientific research work;
- lack of motivation for qualitative performance of duties in several leading positions due to small salary (for example, heads of programmes, heads of sub-programmes, heads of institutes);
- low motivation of students to engage in different events, such as International Pneumobil Competition etc.

Opportunities

- creating and providing interdisciplinary approach in research;
- focusing the studies and Bachelor theses on solving modern and practical tasks and connection with real-life production processes and objects;
- ensuring compliance of topics solved in the Bachelor theses with the qualification to be acquired in the studies;
- diversification and improvement of study methods by developing and improving e-studies even further;
- more intense student and academic staff exchange between Latvian and foreign universities;
- attracting foreign students;
- higher involvement of visiting lecturers in studies, especially in profile courses;
- more active student participation in scholarship and study financing support competitions both inside and outside LLU;
- active participation both in research and study projects, including attraction of funding in order to improve studies and research provision.

Hazards

- decrease in the number of students;
- economic and demographic situation in the country;
- material provision for students when starting their last courses;
- low level of preparedness in natural sciences courses of the new students;
- students wish to achieve fast results with as small contribution as possible, without understanding the significance of theoretical basis;
- complicated administration of different scientific research, study material and materially technical basis in order to achieve qualitative results;
- low competitiveness of salary of the new academic staff and large number of courses to be delivered, especially for assistants and lecturers.

It is planned to use the opportunities already listed more widely, continuing and activating the positive experience in developing official cooperation with industry's companies in order to improve the material base of studies in future and engaging the leading industry specialists in reading some special lectures in profile courses and qualification commissions which evaluate the theses of programmes of different levels as a solution for mitigating the weaknesses. To continue field trips to and study traineeship in the leading industry companies. Another planned direction is to develop practically oriented topic offering which could be financed by the leading industry's companies if interested, and hence it would be easier to attract new researchers and next academic staff members and researchers in this direction.

In order to mitigate this hazard, it is planned to change the status of Bachelor's study programme Agricultural Engineering from academic to professional Bachelor programme which has more practical focus and attractiveness from youth perspective. One of paths taken already at the end of this reporting period – a licensed new study programme in English *Biostystems Machinery and Technologies*, in order to attract foreign students. Due to COVID pandemic, it will be implemented in the beginning of the next reporting period, which was initially intended for academic year of

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

The study direction is delivered in LLU Faculty of Engineering. Inclusion of the study direction in TF fully complies with the goal defined in the faculty's regulation (2.1) (only in Latvian): to ensure academic and/or professional education of students, to conduct scientific research in engineering sciences and education sciences. All five institutes of the faculty are involved in delivery of study direction: Institute of Mechanics, Institute of Agricultural Machinery, Institute of Vehicles, Energetics and Education and Household Institution. Other LLU faculties which participate in delivery: Faculty of Agriculture, Forest Faculty, Environment and Civil Engineering Faculty, Faculty of Food Technology, Faculty Economics and Social Development, Faculty of Information Technologies as well as Language, Sports and Lifelong Education (only in Latvian) centres.

LLU Regulation on directors of study programmes stipulate that the programme director who is approved by LLU Senate at an initiative of Study Council is responsible for study programme and its delivery. Main tasks of the programme director:

- to organise elaboration of the study programme on the basis of a resolution of the Faculty Council regarding creation of a new study programme and Senate's resolution *On regulation on elaboration and approval of study programmes in LLU*;
- to prepare a body of documents for licensing of the study programme and to submit it to the Study Programme Licensing Commission;
- to prepare information for annual report on self-assessment of study programme direction and self-assessment report of study programme accreditation;
- to organise and ensure elaboration of programmes of study courses according to requirements, to coordinate improvement of courses, course consequence and compatibility;
- to submit a study plan and also detailed programmes of study courses, traineeships and other elements of the programme for review in the faculty's Methodological Commission;
- to monitor and coordinate the preparation of courses, traineeships, final examinations / tests and other elements of the programme and submission thereof to LLU IS study course register, and to monitor information update in it.
- to cooperate with faculty's dean and heads of the structural units, academic staff members and students in order to improve the programme;
- to consult students and other interested persons about renewal of studies / starting of studies at later stages;
- to academically recognise courses, traineeships or their parts by harmonising it with a dean, to determine in which semester a student should be admitted;

- to inform students on actual processes, activities and requirements for studies on a regular basis;
- to organise alumni, employer and student surveys, analyse their results and come up with ideas on how to prevent the shortcomings;
- to follow-up the evaluation of academic staff members involved in the study programme available on LLU IS, to evaluate results;
- to cooperate with LLU Study and Communication and Marketing centres to promote the study programme, prepare information for applicants and other stakeholders about the study programme to be published in brochures, LLU portal, faculty's website and elsewhere;
- to accept and examine appeals according to LLU Study Regulation.

Study programme's director has a right to: initiate changes in study programme by informing the head of profiling structural unit and dean; to request study-related information from LLU structural units; to provide suggestions about elaboration of internal regulations of LLU and improvements in the existing ones.

An important institution in creating and organising study directions in the structure and also provision of cooperation among programme directors is Methodological Commission which is approved by the Faculty Council. See the management structure of the study field in the annex *2_part_2_annex*. The Methodological Commission comprises: a dean or vice-rector, programme directors, student representative, secretary etc. The head of the Methodological Commission is appointed upon mutual agreement among commission members. The main tasks of the Methodological Commission: review and harmonise programmes' plans according to applicable laws and regulations of LR and internal regulating documents of LLU; review and evaluation of new courses; evaluation of study programmes' licensing, accreditation and self-assessment reports; review and harmonisation of study plans; review and evaluation of course programmes, their content, according to guidelines of study programme / sub-programme. The Methodological Commission is entitled to turn down corrections introduced in the study plans if they fail to comply with the requirements of laws and regulations of LR or LLU regulations or goals and tasks of the study programme; to follow-up performance of cooperation contracts signed in the faculty regarding continuation of studies at next study level; to initiate the necessary changes in study programme and courses in terms of content and volume by informing the faculty council about it.

Since the Methodological Commission includes also faculty's dean, the Commission also solves all the necessary and required support to administrative and technical staff of the study direction.

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

Admission to studies goes hand in hand with the Admission Requirements approved by LLU Senate where all study programmes are listed and described and conditions and requirements for admission to studies are defined. There are individual admission conditions for [undergraduate](#), [graduate](#) and [postgraduate](#) studies (only in Latvian). Students are admitted subject to competition

and in line with competition criteria stated in the procedure for enrolment. Admission is regulated by a special [order](#) (only in Latvian) of study vice-rector, which defines mutual rights and obligations of applicant and LLU in the enrolment process. Admission requirements are traditionally approved in October of previous year and they are available for general public on LLU website. Admission procedure is implemented by LLU Admission Commission created with an order of the study vice-rector *On procedure of admission in LLU* and technical admission secretariats of the faculty.

Admission to undergraduate programmes is subject to mandatory requirements – secondary or vocational education. Students are admitted to the undergraduate programmes subject to a competition, judging from the average results of centralised examinations in Latvian, foreign language (English, German, French or Russian), mathematics and physics. Applicants who qualify for the mandatory requirements and are in TOP 3 of LR Olympiads, scientific-research papers of LR pupils at national or international scale and approved by LR Ministry of Education and Science in subjects indicated by the faculties (for study direction – physics, mathematics) and science fields / sections (for study direction – Mathematics, Astronomy, Informatics (programming), Physics, Computer Science and Informatics, Engineering Sciences and Technologies).

Applicants can apply for the studies through [e-services](#) and joint enrolment system where applications for 12 Latvian higher educational institutions are processed simultaneously. The joint enrolment system has several advantages: higher educational institutions can measure interest of prospective students in study programmes; applicants can apply for studies closer to their domicile and follow-up potential study programmes remotely and also receive competition results quickly. However, the system has its shortcomings: an applicant applies for several programmes and usually the number of applications does not conform to actual number of applicants; it is not possible to receive a feedback on their choice or changes in their choice; some applicants are not aware of the selection priority principle applied to enrolment.

All information about the studies and admission to [graduate](#) and [postgraduate](#) programmes is available on the website. International [students](#) can also find information about admission in English.

Admission requirements for [Master's](#) study programme Agricultural Engineering (only in Latvian): without additional requirements – graduated from Bachelor's study programme *Agricultural Engineering, Applied Energetics, Machine Designing and Production*; additional requirements – persons holding a Bachelor's degree or having acquired second level professional higher education in different study direction can be admitted to the programme if diploma annex shows engineering study courses with at least 35 credits from the following or equal courses: Mathematics, Physics, Chemistry, Mathematical Modelling, Informatics, Electrical Engineering, Energetics, Electronics, Electrical Technology, Electric Power Supply, Heat Supply, Computer Graphics, Descriptive Geometry, Engineering Graphics, Metal Processing, Material Science, Theoretical Mechanics, Material Resistance, Machine Elements, Machine Dynamics, Hydraulics and Hydraulic Drive, Heat Engineering, Measuring Technique, Tolerances, Automation. Volume of determined credits can be decreased by aligning practical work experience in the chosen study direction with relevant reference from the workplace where the service duration and main job responsibilities are indicated: one year spent in a work leads to reduction by 5 credits and two years spent in work – by 10 credits.

Admission requirements for [doctoral](#) study programme (only in Latvian): Master's Degree in Agricultural Machinery, Transport, Energetics, Machine Building and related specialities; entrance examination – Master's Degree in related engineering sciences sub-field which is not related to agricultural technology.

Procedure for enrolment of foreign students is [described](#) on LLU website and defined in the

Admission Requirements approved by LLU Senate. They state that foreigners are admitted to LLU in compliance with Article 83 of the [Law](#) On Higher Educational Institutions; LLU is organised by the International Cooperation Centre (SSC) in collaboration with the Study Centre (SC) and Language Centre. A foreigner is registered for studies in LLU if the following conditions fulfil: applicant has a secondary education and final examination assessment corresponds to general admission requirements of LLU; according to Article 85 of the Law On Higher Education Institutions, a reference was received from the Academic Information Centre on academic recognition of previous education documents; the applicant qualifies for the admission requirements of relevant study programme related to entry and residence in Latvia; applicant has paid a study fee for the first study year. The admission procedure is completed in SSC by drawing up and handing over the created student file to SC. Admission to doctoral studies is subject to the Admission Regulation, approved in the Senate, information about the admission process and documents to be submitted is available on LLU [website](#).

In the programmes of study direction, it is possible to start studies also at later study phases if knowledge, skills and competences have been built in formal or informal education. Information about commencing studies at later study phase, [changing](#) (only in Latvian) of university for another and [renewing](#) (only in Latvian) study status, can be found on LLU website. These conditions are based on the Cabinet [Regulation](#) (only in Latvian) *Procedure for starting studies at later study phase*. It is governed by an order of LLU Rector of 05.09.2018 *On the procedure for starting studies at later study phase in LLU*.

At later study phases persons can start studying in LLU studies, if they have previously acquired higher education programme or a part of it which is licensed or accredited according to laws and regulations: by changing the higher education institutions and staying at the same or lower study programme in LLU; changing the study programme to another of the same or lower level in LLU; restarting studies in LLU after a break (expelling); by continuing studies in higher education programme to acquire Bachelor's degree or second level professional higher education after undergraduate studies; by continuing studying after acquisition of qualification / degree at the same level of study programme, for another qualification; by applying to take the final study examinations. Studies can be started at a later study phase in LLU programmes if, according to regulations on competences acquired outside the formal learning or obtained in professional experience, knowledge, skills and competences acquired outside the formal learning or obtained in professional experience are recognised.

With an order of study vice-rector of 09.02.2018 *On TF Commission performing recognition of learning outcomes acquired in prior learning or professional experience*, a commission for evaluation and recognition of learning outcomes of prior education or professional experience has been approved, and it consists of a dean and directors of undergraduate studies. Since the issuing of the order, prior education in the Bachelor's study programme Agricultural Engineering was recognised for 24 students.

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

The most important criteria applied to evaluate student performance, which make the study

programme, direction and faculty strategy, are taken into account as complex indicators: student satisfaction, employer feedback, alumni competitiveness in the labour market (application of knowledge, skills and competences in professional activity), accreditations – national and international, admission / graduation indicators, financial indicators etc.

Meanwhile the basic principles and procedure for evaluating the students' knowledge are dictated by Cabinet Regulation *Regulation on national education standard* and internal regulatory documents.

The **basic principles for assessing** the students' study outcome:

- Open assessment principle – there is a set of requirements defined for study achievement assessments according to the set goals and tasks of the study programme as well as goals and tasks of the courses. LLU Study Regulation (only in Latvian) states that study results are evaluated by two indicators: qualitative (tests are assessed in 10-point system or given pass/fail) and quantitative (volume of the course in credits, including both classroom and independent work – the volume is indicated in study plan).
- Compulsory assessment principle – a student must pass all tests/exams of the programme.
- Principle of assessment review – LLU Study Regulation lays down the procedure of appeal.
- Principle of variety of tests and exams used in the assessment – various tests and exams are used to assess the programme acquisition, which are laid down in the study plan.

Course programmes (see Annex 10 Descriptions of Study Courses) which are elaborated according to programme's mapping and coherence with programme's goals, knowledge to be obtained, skills and competences. Course programme defines knowledge, skills and competences and also the way and level of their delivery and indication at learning pathways. Course programmes define: testing and examination methods; assessment criteria and methods. The programmes are placed in e-study platform Moodle and each university lecturer introduces students to it in the beginning of studies. Evaluation is built on the principle of positive performance accumulation, which allows the students to show an extent to which they have achieved the expected outcomes.

Assessment principles for **theses** are defined in the *Regulation on final study examinations* and subordinated regulatory documents. These documents, including TF Methodological Regulation (only in Latvian) for elaboration and defense of theses, order of LLU Rector No. 4.3.-8/72 of 04.10.2017 on violation of academic integrity in theses include all activities for quantitative and qualitative evaluation of the theses in all levels of studies. LLU has joined Single Computerised Plagiarism Control System, where all LLU theses are cross-checked. Total assessment in 10-point scale comprises evaluation of thesis, its review / review and defense in front of the Theses Evaluation Commission.

Traineeship assessment is based on LLU Traineeship Regulation (only in Latvian) Study Vice-rector's order *On preparation of traineeship orders in LLU IS* defines person in charge of preparation of dean's order on traineeships in LLU Information System. The traineeship is assessed by the traineeship goal, tasks and individual assignments. Total assessment of traineeship is made of several sections of traineeship process: traineeship report, feedback from the traineeship's workplace, presentation of traineeship report. The traineeship is evaluated either in 10-point system or as pass/fail. The traineeship is assessed by the traineeship supervisor or commission.

Procedure **for thesis assessment** and procedure and criteria for conferring PhD degree are laid down in LR Cabinet Regulation (only in Latvian) No. 1001 *Procedure and criteria for conferring degree of Doctor of Science*, LLU Regulation (only in Latvian) by promotion councils and promotion. According to these regulatory documents, theses are evaluated and PhD degrees are conferred by

the Promotion [Council](#) (only in Latvian) of Environment Engineering and Energetics Industry. Requirements on how the thesis must be executed are provided by the [Regulation](#) (only in Latvian) on technical execution of a scientific thesis to be submitted to the Promotion Council. Procedure of doctoral studies and procedure for appeals are regulated by the Doctoral Studies [Regulation](#) (only in Latvian).

Procedure, criteria and principles of evaluation of different levels of students' achievements allow attaining programmes' goals and put in place student-centred assessment.

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

LLU principles of academic integrity, mechanisms of compliance and ways to inform the persons involved are laid down in the Academic Integrity [Regulation](#) (only in Latvian) which defines academic integrity as performance of academic work in line with the highest professionalism and accuracy standards, objectivity and trueness, principles of moral and ethics, integrity, including prevention of plagiarism, provision of true data and accuracy in academic publications, as well as communication and publicity events, which all contribute to the image of academic environment.

LLU staff encourages academic integrity by [abiding](#) to following principle in their work: responsibility, respect, integrity, integrity, impartiality, justice and trust. Academic integrity principles are observed by LLU academic and general staff, students and university's administration.

The goal of academic integrity:

- to nurture high academic and scientific culture;
- to promote public's trust in education quality and results of scientific research;
- not to permit and to prevent violation of academic integrity principles;
- to define measures for dishonest and forbidden actions.

Students and LLU academic, general, scientific and administrative staff are equally responsible for adherence to academic integrity principles and consequences of violation of such principles. LLU has elaborated and complies with certain procedures in order to cross-check for thesis plagiarism and conduct if such is detected:

- study vice-rector's order (2017) *On the procedure according to which digital copies of theses must be submitted and cross-checking of theses in plagiarism control system*. The order defines the procedure of digital copies of Bachelor, Master theses, qualification papers, diploma papers / diploma projects and Doctoral theses to the plagiarism control system;

- rector's order (2017) *On violations of academic integrity in final papers / theses*. The order lays down the procedure for activities to be taken when establishing the violations of academic integrity in LLU final papers or theses. The procedure laid down in the order is described below. When detecting a concordance of 10% and above with other / other works available in internet in the Single Computerised Plagiarism Control System, the technical expert of plagiarism control sends the result for comparison and texts of compared works to the author's programme director and

head of the Methodological Commission of the faculty. Methodological Commission of faculty where the author of thesis is studying invites the supervisor and evaluates in more detail the materials sent by the technical expert of plagiarism control to establish if the thesis is or is not a plagiarism. If the plagiarism is established, thesis' author is asked to submit a written explanation and he or she is invited to the Methodological Commission sitting where an issue of author's expelling is decided. The minutes of the MC sitting are submitted to the faculty's dean, which is added to the exmatriculation order.

Information about plagiarism control system can be [found](#) (only in Latvian) also on LLU [website](#) (only in Latvian) LLU takes [measures](#) for evaluating and promoting the academic integrity principle. Until 2021, LLU has cross-checked 5961 theses and 20 students were expelled for the [violation](#) of academic integrity principle. So far, no thesis in any of study direction programmes has violated the principle of academic integrity.

1.8. Specify the websites (e.g. the homepage) on which the information on the study direction and the relevant study programmes is published (in all languages in which the study programmes are implemented) by indicating the persons responsible for the compliance of the information available on the website with the information published in the official registers.

Information about all programmes in the study direction is published on [LLU website](#). Information about [undergraduate](#) programme *Agricultural Engineering* is available on LLU website. There one can find both information about the very programme and information about the faculty and video tour in the faculty. Information about other programmes in the study direction is available on the website: Machine [Design](#) (only in Latvian) and Production, Biosystem [Machinery](#) and Technologies, also [Master](#) and [Doctoral](#) (only in Latvian) programme. There are also presentation brochures about the [undergraduate studies](#) and [graduate](#) studies (only in Latvian). Information about procedure of [doctorate](#) (only in Latvian) can be found on LLU website.

Study Centre is responsible for information regarding study programmes, while International Cooperation Centre – for programmes and materials in English. Study information is coordinated with relevant programme director.

Information about LLU study programmes is available on [Prakse.lv](#). (only in Latvian) Person in charge of placing the information in portal is project manager of the Lifelong Education Centre.

Information about LLU study programmes is available also in National Education Possibilities [database](#) (only in Latvian).

Information about LLU study programmes in English for foreigners interested in studies:

- about LLU programme's offer in [English](#) where a description of every programme is detailed up to the plan of study [courses](#);
- information about [LLU](#);
- about enrolment [process](#);
- about [immigration](#) procedures;
- about [preparation](#) period, conditions of [studies](#) and daily life;

- about [feedback](#) of foreign students;
- about academic mobility and [exchange](#) study possibilities.

LLU has subscribed for study [e-marketing website](#).

Programme director and external relations coordinator of the faculty are responsible for compliance of information content or changes thereof placed on the website with the official information, and LLU International Cooperation Centre external relations coordinator is responsible for placing the information in the mentioned websites.

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

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

The internal quality assurance system represents a continuous cyclic process aimed at persistently improving and developing the study direction and the programmes contained therein. The internal quality assurance system is based on E.Deming’s cycle (plan-do-check-act).

In order to ensure fact (data)-based decision making (“plan” stage), as well as to assess the effectiveness of improvement and enhancement measures or the internal quality assurance system (“check” stage), there have to be individuals responsible for collecting data, targets have to be set and there have to be individuals responsible for achieving the targets.

The indicators showing the effectiveness of an internal quality assurance system are classified into three categories:

- indicators of quality of studies;
- indicators of qualifications and work quality of teaching personnel;
- indicators of the environment for studies.

Targets or expected performance are set for admission and forecasts for LLU in the TF Operational Plan for implementing the LLU Development [Strategy](#) 2015-2022 and in the LLU Development Strategy 2015-2022.

The internal quality assurance system and its performance indicators are summarized in Table 2.1.

Table 2.1

Indicators showing the performance of the internal quality assurance system

Indicator	Data collection frequency	Data collection mechanism
Indicators of quality of studies		

Number of matriculated first-year students	Once a year before 1 October	The data collected by the LLU Centre for Studies are sent to the dean of TF and programme directors for preparation of annual self-assessment reports and execution of the TF Operational Plan as well as for analysis of the data
Applicant to place ratio	Once a year before 1 September	The data collected by the Admission Committee are sent to the dean and discussed at an TF Board meeting
Number of students in a programme	Once a month	The data collected by the LLU Centre for Studies are sent to the dean of TF and the programme director for preparation of an annual self-assessment report and execution of the TF Operational Plan as well as for monthly analysis of the data
Number of occupied government-funded study places	Once a month	The data collected by the LLU Centre for Studies are sent to the administration of LLU and the deans and vice-deans of the Faculties
Number of drop-out students	Once a year before 1 October	The data collected by the LLU Centre for Studies are sent to the dean of TF and programme directors for preparation of annual self-assessment reports and execution of the TF Operational Plan as well as for analysis of the data
Number of matriculated students at later stages	Once a year before 1 September	The programme director collects the data for an annual self-assessment report
Student mobility	Once a year before 1 September	The data collected by the LLU International Cooperation Centre are sent to the dean of TF and programme directors for preparation of annual self-assessment reports and execution of the TF Operational Plan as well as for analysis of the data
Graduation to admission ratio in a programme	Once a year	The programme director collects the data for an annual self-assessment report
Number of graduates	After defence of graduate thesis	The data collected by the LLU Centre for Studies are sent to the dean of TF and programme directors for preparation of annual self-assessment reports and execution of the TF Operational Plan as well as for analysis of the data
Average mark for graduate theses	After defence of graduate thesis	The Thesis Defence Committee collects the data for a report on the Committee's work
Number of graduate theses to be used in practice	After defence of graduate thesis	The Thesis Defence Committee collects the data for a report on the Committee's work
Number of best graduate theses	After defence of graduate thesis	The Thesis Defence Committee collects the data for a report on the Committee's work
Alumni employment	Once a year/ Once every five years / continuously	The LLU Centre for Studies and the programme director conduct a survey of alumni before the alumni gathering. The organisers (responsible organisational unit) of the Alumni Week collect relevant data
Quality of studies (student average rating on a 5-point scale)	Once a year	The LLU Centre for Studies collects the data for execution of the TF Operational Plan

Student satisfaction with a programme, student expectations	Once a year	The programme director conducts a survey of students
Alumni assessment of a programme	Once a year	The programme director conducts a survey of alumni
Employer assessment of a programme	Once a year	The programme director conducts a survey of employers
Number of proposals and complaints submitted	Every month	The responsible person collects the data and reports at a monthly Faculty Board meeting

Indicators of qualifications and work quality of teaching personnel

Conformity of the qualifications of teaching personnel with the requirements of the regulatory framework	Once a year	LLU Personnel Department
Teaching personnel to student ratio	Once a year	The programme director collects the data for an annual self-assessment report
Turnover of teaching personnel involved in delivering courses, cooperation among the teaching personnel to deliver the courses	Once a year	The programme director collects the data for an annual self-assessment report in cooperation with the heads of organisational units
Teaching personnel's participation in professional development courses, seminars etc.	Once a year	The heads of organisational units collect the data for an annual self-assessment report and for execution of the TF Operational Plan
Number of research papers produced by teaching personnel	Once a year	The heads of organisational units collect the data for execution of the TF Operational Plan and for an annual self-assessment report and a report Research Performance
Teaching personnel's participation in research projects	Once a year	The heads of organisational units collect the data for execution of the TF Operational Plan and for an annual self-assessment report and a report Research Performance
Teaching personnel's participation in mobility programmes	Once a year	The LLU International Cooperation Centre collects the data for an annual self-assessment report and for execution of the TF Operational Plan
Number of teaching aids produced by teaching personnel	Once a year	The heads of organisational units collect the data for an annual self-assessment report and for execution of the TF Operational Plan. A contest of teaching aids
Assessment of teaching personnel members	Twice a year	The LLU IS administrator, the heads of organisational units and the programme director

Cooperation between teaching personnel and students in research activities	Once a year	The programme director collects the data for an annual self-assessment report
Number of teaching personnel hospitalised	Once a year	The heads of organisational units collect the data on hospitalisation
Number of the syllabuses of courses enhanced	Once a year	Programme directors collect the data for an annual self-assessment report in cooperation with the heads of organisational units
Teaching personnel's participation and representation of TF in public organisations, public activities and opinion-shaping events	Once a year	The heads of organisational units collect the data for an annual self-assessment report and for execution of the TF Operational Plan
Number of visiting lecturers from foreign universities	Once a year	The heads of organisational units collect the data for an annual self-assessment report and for execution of the TF Operational Plan
Number of visiting lecturers with whom LLU has concluded a contract for delivering a course	Once a year	The LLU Personnel Department collects the data for execution of the TF Operational Plan
Number of industry professionals involved in the learning process	Twice a year	The heads of organisational units collect the data for an annual self-assessment report and for execution of the TF Operational Plan
Indicators of the environment for studies		
Numbers of books purchased and databases subscribed	Once a year	Programme directors collect the data for an annual self-assessment report in cooperation with the head of the LLU Library
Material and technological resources	Once a year	Programme directors collect the data for an annual self-assessment report in cooperation with the heads of organisational units

The data collected are analysed, assessed and interpreted to:

- prepare an annual report and a self-assessment report on the study direction, which are reviewed by the TF Board, the LLU Council for Studies and approved by the LLU Senate;
- prepare a report on execution of the TF Operational Plan for implementing the LLU Development Strategy 2015-2022, which is reviewed by the TF Board, and afterwards the TF dean reports on the performance at an LLU Rector Office meeting. Based on the collected performance data on the Operational Plans of the Faculties, the LLU rector reports to the LLU Council on the results of implementation of the LLU Development Strategy 2015-2022;
- prepare reports of thesis defence committees, which are reviewed and approved by the TF Board;
- use the performance results to assess, review and enhance the study direction and the programmes contained therein;
- assess the effectiveness of the internal quality assurance system for the self-assessment report (see Section 3, characteristics of the relevant programme).

The study direction involves carrying out the following **quality assurance activities**:

- preparing an annual self-assessment report for the study direction (responsible: the Methodology Commission, programme directors);
- enhancing and developing the programmes (responsible: programme directors, the Methodology Commission, the TF Board);
- planning and controlling the implementation of the programmes (responsible: the LLU Centre for Studies, programme directors, heads of organisational units);
- enhancing and changing a study plan (responsible: programme directors, the Methodology Commission, the TF Board);
- enhancing the syllabuses of courses (responsible: teaching personnel, programme directors, the Methodology Commission, the TF Board);
- analysing the learning outcomes and attendance of students (responsible: programme directors);
- hospitation of teaching personnel (responsible: heads of organisational units, programme directors, teaching personnel);
- provision of material and technological resources (responsible: the dean);
- provision of methodologies and information for the learning process (responsible: LLU Library personnel, teaching personnel).

At the end of every academic year, a survey of students, a survey of alumni and a survey of employers are conducted. The survey results are aggregated, discussed and used to enhance the study direction and its programmes and courses.

In accordance with the internal regulations of LLU, the syllabuses of courses/practice are reviewed and enhanced at least once every two years as well as during preparing a self-assessment report.

Twice an academic year after graduate theses have been defended, the theses are analysed both at the institutes of TF that are responsible for delivering the programme, which discuss the theses defence results, and at the TF Board, which approves a report by the Thesis Defence Committee.

After the reports by the Thesis Defence Committees have been approved, the programme director reviews the guidelines for writing and formatting a thesis and, if necessary, amends the guidelines. Amendments to the guidelines are discussed at the institute responsible for implementing the programme, the Methodology Commission and approved by the TF Board.

In order to improve the quality of the learning process, guest lectures are organised both within the TF as a whole and within specific courses. Guest lecturers from LLU partner universities also deliver guest lectures. Study tours are also organised when students visit specialists and entrepreneurs of the relevant field

Efforts are persistently made to attract new teaching personnel to the study direction. Doctoral and master students as well as alumni as professionals in the relevant field are also involved in it.

The quality of teaching personnel engaged in delivering courses in the study direction is also regularly assessed. At the end of each semester, a survey of students on the courses taken and the quality of work of the teaching personnel delivering the courses is conducted. The survey is conducted electronically in the LLU Information System. The survey results are summarised and available to the programme director and the heads of organisational units, while each teaching personnel member can see a rating of his/her performance. The survey results give teaching personnel an opportunity to analyse and enhance their work, while programme directors are given

valuable recommendations on how to enhance the quality of the programmes. In addition, the administration of LLU and the heads of its organisational units use the information acquired to implement activities aimed at contributing to the quality of studies at university level. The survey results represent one of the key criteria in the teaching personnel motivation system. The questionnaire for surveys is regularly reviewed, and representatives of the LLU student self-government are involved in it.

In the academic year 2018/2019, LLU introduced hospitation, which is carried out by the programme director, the heads of LLU organisational units or other teaching personnel (LLU Council for Studies decision On the Procedure of Hospitation of Classes at LLU, at 27.02.2019). The hospitation of classes is carried out at least once every six years, while the classes delivered by teaching personnel until 3-year service length are hospitated at least once a year. The classes of a teaching personnel member are hospitated no more than once or twice an academic year. In case of unsatisfactory student ratings, the hospitation of classes could be organised more frequently to ascertain whether the students' ratings are unbiased. The total results of class hospitation are examined once an academic year at meetings of LLU organisational units. The teaching personnel who had been given suggestions/recommendations for improvement of their classes in the hospitation form have to provide information about the way they have improved their classes.

The collections of the LLU Fundamental Library is persistently supplemented with the literature in Latvian and in English that has been suggested by teaching personnel. The teaching personnel themselves also write textbooks and monographs.

The administration of TF and other organisational units of LLU ensure the quality of material and technological resources meets the learning needs of students.

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

The main internal legal document governing this procedure is the Senate decision No. 10-5 of 13 March 2019 "Regulations regarding the Development, Approval and Change of Programmes at LLU". The procedure stipulates that the TF Board makes a decision on the development of a new programme and appoints a potential programme director who directs the development of the programme's curriculum. The curriculum of the programme is reviewed by the TF Methodology Commission and the TF Board. An independent assessment and expert evaluation of the programme have to be done before the programme's documents are discussed by the Council for Studies and approved by the LLU Senate; doctoral programmes are also submitted for approval to the Doctoral Council for the relevant branch of science.

The independent expert evaluation of the programme includes a justification of the usefulness of the programme, also indicating the most significant differences of the programme from similar programmes of the same level and the programmes of the same study direction implemented by

LLU. The independent expert evaluation of the programme could be done by specialists of the relevant field (industry) (but not those involved in designing the programme) or representatives of other universities/colleges. The expert evaluation is organised by the Faculty being responsible for the programme. The Senate, making a decision on the approval of the programme, appoints the programme director as well.

The procedure of development and approval of a new programme and the persons or institutions responsible for the implementation and supervision of it ensure that:

- the programme has been developed in line with the goal, which is subordinated to both the strategic goal of the study direction and is consistent with the LLU Development Strategy;
- expected learning outcomes have been clearly defined for the programme;
- the curriculum of the programme ensures the learning outcomes are achieved;
- the programme has been developed by involving students, employers, external experts and other stakeholders;
- the programme is in line with the four higher education objectives recommended by the Council of Europe;
- the programme has been developed in conformity with the level of higher education as defined in the national qualifications framework and, consequently, it is extended to the corresponding level of the qualifications framework of the European Higher Education Area;
- the programme has been developed to ensure that students can progress in their studies, and there are no barriers;
- the programme defines the expected workload of students;
- the programme provides an opportunity for students to have practical training.

The programmes contained in the study direction are regularly assessed and reviewed in order to ensure their proper performance and create a supportive and effective learning environment for students. Students, alumni, employers, industry experts and other stakeholders are involved in enhancing the programmes contained in the study direction.

In assessing a programme, students are involved in various ways. As regards the programmes with a large number of students, such as “Agricultural Engineering”, the programme directors conduct a survey of students at the autumn semester and end of the academic year in order to identify the students’:

- satisfaction with the content delivered and the way their learning is organised;
- ratings of the work of teaching personnel and mutual communication;
- opinions about whether the resources available for learning meet the standards defined by the programme.

Besides, students are given an opportunity to express their objections, suggestions as well as their wishes for the necessary improvements in the programme. In accordance with Paragraph 3.18. of the LLU Senate decision No. 9-81 of 12 April 2017 Regulations regarding Programme Directors, the programme director summarizes the data of student survey questionnaires, the students’ objections, suggestions and wishes and designs measures for improvement. The programme director reports on the survey results at the responsible institute as well as at a meeting of the TF Board when discussing an annual self-assessment report. Students are informed about the survey results at meetings with the programme director. In addition, students get feedback by attending TF Board meetings as student representatives (TF Board - 4).

Programme directors regularly meet with their students, ensuring information exchange and feedback during the meetings.

In assessing a programme, alumni are involved by means of surveys to identify the alumni’s:

- satisfaction with the programme and its curriculum;
- ratings of the work of teaching personnel and mutual communication;
- satisfaction with the learning environment and the performance of university support services;
- future plans in the context of the programme.

The assessment of a programme (especially in the context of learning outcomes achieved) through graduate theses and their defence is done also during the work sessions of final examination committees, in which employers are also included. After a Final Examination Committee has completed its work session, a report is prepared on the work of the Committee in accordance with the vice-rector for studies ordinance No. 02.1-03 / 78 On the Procedure of Preparation of Reports on Final Examinations at LLU. Before preparing a report at the end of the session, the quality of graduate theses, the learning outcomes demonstrated by the students during their defences and suggestions for enhancing the learning process and the programme are discussed. The marks of graduate theses also reflect the level of learning outcomes achieved in the programme.

In accordance with the above-mentioned procedure, when approving a report at the TF Board meeting, its content is reported by either the chair of the final examination committee or the vice-chair of the committee, that is, the programme director. The report is also delivered at the TF graduation ceremony, thereby providing feedback. Paragraph 5.2 of the “[LLU Traineeship Regulation](#)” (only in Latvian) states that the student has to have a reference of the work placement supervisor from the hosting organisation, which is submitted to the institute within the timeframe specified. During the defence of the work placement report, the reference is also analysed for the purpose of enhancement of the programme. The content of the reference is discussed with the student during the defence of the work placement report. Along with the work placement supervisor’s reference, the student has to also submit a questionnaire completed by the employer – the hosting organisation –, which aims to find out the employer’s:

- opinion on the student’s preparedness for the labour market;
- assessment of the student’s competences.

The employer is also asked to make suggestions for enhancement of the programme. The questionnaires and references of work placement supervisors are summarised by the programme director or the teaching personnel member responsible for the organisation of training, and the results are reported at a meeting of the institute responsible for the implementation of training as well as at an TF Board meeting when discussing the annual self-assessment report.

The programmes contained in the study direction are assessed by also industry professionals within [project](#) No. 8.2.3.0/1/A/009 (only in Latvian) Enhancement of the Governance of Latvia University of Life Sciences and Technologies. The project intends to assess the programmes; draw up a modernisation plan for the programmes; enhance the programmes; build up the programme directors’ knowledge of and skills and competences in curriculum development and management of the quality of the learning process and learning outcomes as well as in development and introduction of innovative curriculum content and teaching approaches etc.

During the assessment of the programmes, industry professionals meet with the programme directors and discuss the curricula of the programmes and their conformity with labour market needs. Any programme director follows the learning outcomes of students in the courses contained in the programme, which is an indicator of the level of expected learning outcomes achieved. The programme director meets with the teaching personnel members delivering courses in which learning outcomes are poor to discuss the reasons of it and find solutions to this problem. The students are also heard in relation to the reasons of poor learning outcomes.

The programme's goal and expected learning outcomes are also revised along with the approval of a new planning period for the LLU Development Strategy, as the goals of the programmes contained in the study direction are subordinated to the strategic goal of the study direction, which, in its turn, is subordinated to the LLU Development Strategy. Any strategic goal, programme goals and expected learning outcomes to be enhanced are discussed when approving the annual self-assessment report.

LLU has developed the procedure Preparation of an Annual Report on the Study direction, which prescribes activities for the preparation and review of an annual report on the study direction according to vice-rector for studies ordinance 6 October 2020 Procedure of Preparation of a Self-assessment Report and an Annual Report on the Study Direction. In accordance with the procedure, reports on the study direction are discussed at a meeting of the TF Board, then reviewed at a meeting of the Council for Studies, approved at a meeting of the LLU Senate and published on the LLU [website](#) (only in Latvian).

The programme director's obligation is also to revise the programme's curriculum and make amendments to it according to the enhancements necessary for the programme. LLU has developed the procedure *Making Amendments to the Study Plan of a Programme*, which regulates the study [plan](#) (only in Latvian) of any programme. The procedure stipulates that the programme director has to inform the head of the relevant department/centre/institute and the dean of the relevant Faculty about the amendments made and the amendments have to be discussed by the Methodology Commission and approved by the Faculty Board; besides the LLU Centre for Studies has to be informed about the amendments, submitting an enhanced study plan and a justification for the amendments made. The stakeholders are informed about the amendments by making the enhanced study plan on the LLU [website](#) (only in Latvian).

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

Students have a possibility and they are entitled to submit suggestions and complaints about study process and related matters during the studies. The students may submit the suggestions:

- in the faculty, in a written or verbal form, - to the programme director, institute director, vice-dean or dean;
- in a written or verbal form at LLU management level - in the Study Centre, to study vice-rector, Study Council and Senate and when confirming different normative documents.

LLU Study [Regulation](#) (only in Latvian) (Clause 5), which is publicly available on LLU Website, describes the procedure for appeal submission and review.

A student is entitled to present a complaint about:

- assessment of final test / examination;
- organisation and procedure of study process;
- tuition fee;

- exmatriculation

If a student has a complaint, he or she verbally agrees with the academic staff member in charge or other LLU employee who is responsible for the process involved on a resolution of situation. If a verbal agreement cannot be reached, the student may submit a written appeal to the head of a structural unit in charge (head of department (centre) / institute director, programme director or faculty dean).

If a student has submitted a written complaint, he or she will receive a written reply once the complaint is reviewed in case the complaint has been examined in absence of student.

The highest instance for solving the disputes where a student can submit their applications is LLU Arbitrage which operates according to its Rules.

Students have not lodged any complaint to the study direction during the reporting period. Faculty's administration tries to solve all objections about different situations in negotiations. Earlier there were situations where written complaints were received, and it resulted in situations when the academic staff members were replaced and even dismissed.

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

Statistical data and performance (learning and research) data are collected at certain intervals according to the purpose of use and functional levels of the learning process and research. **Learning performance data are collected** based on both external requests for data on students, alumni and academic personnel and internal requests in line with the purpose of use defined.

At LLU level, data on all the Faculties, study direction and programmes are collected and analysed. One a month, the following statistics are collected: 1. the number of students by programme, kind and form of studies, study direction and Faculty – the data are sent to the administration of LLU and the deans of the Faculties. The data are used to track the change in the number of students at LLU; 2. the number of occupied government-funded study places – the data are collected by programme to track this statistic. The data are used to project the number of students to be admitted to fill in vacant government-funded study places and for the rotation of students every semester (the government-funded study places are filled on a competitive basis); the data are sent to the administration of LLU and the deans of the Faculties as well as the vice-deans, if needed. Once an academic year, data are collected on: 1. the number of graduates by programme, study direction, Faculty and kind of finance – the data are used to prepare various reports (e.g. an annual [report](#) on LLU (only in Latvian)); 2. the number of admitted students by various categories. The number of students admitted is used to project and plan the admission for the next year; 3. an LLU statistical data summary, Augstskola-1 (University-1), is prepared for the Central Statistical Bureau (CSB) based on the forms supplied by the CSB. The data summarised are sent to the Ministry of Education and Science and are available to the [public](#) (only in Latvian). The data are also used to draw up various reports (e.g. an annual report on LLU). Once a calendar year, data are collected on: 1. the study direction – a statistical summary is based on data for the previous year: the number of students by programme, kind and form of studies, the number of

graduates and drop-out students and the reasons of drop-out and the number of foreign students. The data are given to all the programme directors, and the data are used for analysis and to prepare an annual [report](#) (only in Latvian) on the study direction; 2. the number of occupied government-funded study places on an annual basis – the data are used to prepare reports on compliance with the terms and conditions of an agreement among LLU, the Ministry of Agriculture and the Ministry of Education and Science; 3. performance of the programmes in accordance with the LLU Development [Strategy](#) 2015-2022 – the data are used to prepare annual reports on achieving the targets set by the strategy and to set new targets for the next year. The reports are presented and discussed at in-person meetings at each Faculty.

At Faculty level, data are collected (for collection frequency and responsible persons, see Table 2.6) and analysed against the targets set in the Education Section of the Strategy (see Table 2.7).

Table 2.7

Education/learning performance of TF (for 2020)

Performance indicator	Target	Achievement
Number of students as at 1 October, incl.:	699	573
Bachelor	561	479
Master	98	77
Doctoral	26	17
Foreign students at all the levels of studies	14	1
Revenue from tuition fees, thou. EUR, a year	267	234.26
Revenue from foreign student tuition fees, thou. EUR, a year	20	3.10
Quality of studies (student average rating on a 5-point scale)	4.30	4.30
Number of foreign visiting lecturers whom LLU has concluded a teaching contract with, a year	6	1
Number of teaching personnel who developed their competences	25	36
Number of programmes employing innovative distance learning methods	0	-1
Number of programmes funded by the government in which the number of students is below the minimum set by the Ministry of Education and Science	0	-2
Number of bachelor programmes in which the number of students is less than 60	0	-2

Number of master programmes in which the number of students is less than 30	0	0
Number of doctoral dissertations supervised by representatives (incl. as second supervisors) of LLU institutions to be consolidated and of foreign cooperation partners, incl.:	0	-6

Research performance data are collected for a specific performance purpose and broken down by level.

At Faculty level, the data are collected once a year to analyse and assess the performance against the targets. The operational plan of TF contains a section for research performance, and an analysis and assessment of the performance is used to examine the performance in relation to the targets set by the LLU Strategy (see Table 2.8).

Table 2.8

Research performance of TF (for 2020)

Performance indicator	Target	Achievement
Number of full-time equivalent (FTE) researchers	14.0	17.66
Number of new doctors of science (degree earned less than 10 years ago) working at LLU, incl.:	15	12
doctors of science who earned the degree less than 5 years ago	5	2
Number of research papers a year, incl.:	90	104
international research papers indexed by <i>Scopus</i> and <i>Web of Science</i> , a year, incl.:	70	83
doctoral student international research papers indexed by <i>Scopus</i> and <i>Web of Science</i> , a year	10	13
Number of research papers published in journals indexed by <i>Scopus</i> and <i>Web of Science</i> , a year	20	25
Number of research papers published in journals indexed by <i>Scopus</i> and <i>Web of Science</i> , the impact factor of which is at least 50% of the average citation index for the industry, a year	3	8
Number of popular science articles, a year	10	10
Number of international research papers with at least one foreign co-author	15	37

<i>Number of research papers co-authored by private sector participants, a year</i>	1	5
<i>Number of EU programme Horizon 2020 project proposals prepared and submitted that acquired at least a minimum score</i>	1	0

Individual performance – the contribution of each academic personnel member to science is identified once a year, and part of the performance relates to that of TF as stated by the Operational Plan, while part of the performance is assessed individually for each personnel member in accordance with the LLU Council of Science decision No. 20-13 at 29 April 2020 *On the Assessment of the Scientific Performance of LLU Academic Personnel, Leading Researchers and Researchers*. Such an assessment analyses the numbers of research projects, research papers, patents, doctoral dissertations supervised, publicity, the number of papers peer-reviewed and organisational activities. The data are uploaded to the LLU Information System (in accordance with the LLU rector ordinance (9 November 2015) *On the Classification of Research Papers, Data Collection and Uploading to the LLU Information System*), and an individual scientific performance portfolio is maintained therein.

At institute level, the individual performance of each academic personnel member as well as each institute’s activities in science and research are summarised once a year and submitted to the LLU Science Centre to analyse the institute’s performance in science and research with regard to the LLU Strategy

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

The internal quality assurance system in the study direction and the programmes contained therein for all the levels of studies is developed in accordance with the European standards, quality assurance requirements and key principles in higher education as prescribed by the European Network for Quality Assurance in Higher Education (ENQA). The internal quality assurance system is based on the key principles of European quality management and the standards set in Part 1 of the guidelines of the European Foundation for Quality Management (EFQM). This approach is used to ensure continuity in the identification of problems, the analysis of their causes and effects, the development of a plan for potential solutions and the assessment and implementation of a new solution.

The programmes contained in the study direction are regularly assessed according to the internal quality assurance system (see Section 2.2.1) and in accordance with the European standards and guidelines for internal quality assurance according to nine criteria as prescribed by relevant LLU and national documents.

An essential part of the internal quality standards and guidelines **is incorporated** in the study direction. The standard Learning Resources and Support for Students has **been partly implemented**. Assigning and allocating learning resources and support to students takes into account the diversity of the student community (students with life experience, part-time, working and foreign students and students with special needs). At several student hostels and Faculties of

LLU, where reconstruction was carried out, necessary facilities for the disabled are available, thereby ensuring access to education for any student. Lifts, specially equipped amenities, ramps, as well as well-equipped rooms are available in some buildings. Information on the environment in particular LLU buildings is available at LLU [website](#) (only in Latvian). Still, a **challenge** is the accessibility of the TF building for students with special needs – no ramp, lift and facilities are specially adapted for disabled persons.

Table 2.9

Standards and guidelines for quality assurance in the European Higher Education Area (EHEA) Part 1

Standards	Guidelines	Integrated	Partly integrated	Challenge
1.1. Quality assurance policy	§ introduction of a quality assurance system	X		
	§ all the organisational units, the administration and individual personnel members and students are responsible for quality assurance	X		
	§ academic integrity and freedom, no tolerance for academic fraud	X		
	§ combating of all the forms of lack of tolerance for and discrimination against students or personnel	X		
	§ involvement of external stakeholders in quality assurance	X		
1.2. Development and approval of programmes	§ programmes are designed in accordance with the strategic goal, which is in line with the LLU Strategy, and have expected learning outcomes clearly defined	X		
	§ programmes are designed by involving students and other stakeholders	X		
	§ external expert evaluations are done and benchmarks are employed	X		
	§ four higher education objectives recommended by the Council of Europe are taken into account	X		
	§ expected workloads of students are identified by using the ECTS	X		
	§ if necessary, well-planned work placement is included	X		
	§ programmes are subject to the procedures of approval set by LLU	X		

1.3.1. Student-focused learning - introduction and delivery	§ the diversity of the student community and their needs have to be taken into consideration and respected in designing appropriate learning pathways	X		
	§ various programme delivery ways, where applicable, have to be taken into consideration and used	X		
	§ where appropriate, a variety of pedagogical methods are used	X		
	§ learning approaches and pedagogical methods are regularly analysed and applied	X		
	§ students' desire for independence is promoted, while providing leadership and support to teaching personnel	X		
	§ mutual respect in the relationship between the student and teaching personnel is promoted	X		
	§ appropriate procedures exist to deal with student complaints	X		
1.3.2. Student-focused learning - assessment	§ teaching personnel are familiar with the methods of testing and examination and receive support to develop their skills in this area	X		
	§ assessment criteria and methods, as well as the criteria for marking, have been made public in advance	X		
	§ assessment gives students an opportunity to demonstrate the extent to which they have achieved the expected learning outcomes. If needed, students receive feedback that provides guidance on the learning process	X		
	§ where possible, more than one examiner does the assessment	X		
	§ assessment rules take into account the different circumstances that students have encountered	X		
	§ assessment is consistent, fair to all students and implemented in accordance with the procedures approved	X		
	§ there is a procedure for processing student appeals	X		

1.4. Student matriculation, learning, recognition of qualifications and certification	§ there are appropriate procedures for admission, qualification recognition and programme completion, including especially in case of student mobility both within and between higher education systems	X		
	§ admission policies, matriculation procedures and criteria are implemented in a consistent and transparent manner. Introductory information about the institution and the programme is given	X		
	§ there are a procedure and tools for collecting and summarizing data and monitoring the progress of student learning	X		
	§ an unbiased recognition of higher education qualifications, periods of study and previous education, including non-formal and informal learning	X		
	§ at the end of their studies, students receive documents specifying their qualifications, including learning outcomes, as well as the context, level, content and status of the studies they have done	X		
1.5. Teaching personnel. The environment at LLU and the Faculties	§ clear, transparent and fair procedures for personnel recruitment and working conditions that demonstrate the importance of learning are established and maintained	X		
	§ opportunities encouraging teaching personnel to develop their professionalism are provided	X		
	§ scientific research activity is stimulated, thus strengthening the link between education and science	X		
	§ innovation in teaching methods and the use of new technologies are promoted	X		

1.6. Resources for learning and support for students	§ there is a range of resources for student learning: libraries, equipment, IT infrastructure and human resources – teaching personnel, learning consultants, support services and other advisers are available	X		
	§ the diversity of the student community (students with life experience, part-time, working, foreign students, students with special needs) is taken into account when planning, allocating and assigning learning resources and support for students	X	X	X
	§ all the resources are fit for the purpose for which they are intended, and students are aware of the services available to them	X		
	§ support and administrative personnel are qualified and have opportunities to develop their competencies	X		
1.7. Information management	§ key performance indicators of the university	X		
	§ the profile of the student community	X		
	§ student learning progress, marks earned and drop-out rates	X		
	§ students' satisfaction with the programme	X		
	§ available teaching aids and support for students	X		
	§ career opportunities for graduates	x		
1.8. Publicity	§ information on the activities of LLU is useful for current and potential students, alumni and other stakeholders and the public	X		
	§ LLU provides information on its activities, incl. on the programmes delivered, selection criteria for admission, expected learning outcomes upon completing the programmes, the qualifications to be awarded, the teaching, learning and assessment procedures used, passing marks or minimum requirements for completing courses and learning opportunities available to students, as well as graduate employment	X		

1.9. Assessment and periodic updating of programmes	§ the curriculum of a programme takes into account the latest research findings in the particular field, thus ensuring the programme meets labour market needs	X		
	§ changing needs of the society	X		
	§ student workloads, progress in student learning and graduation	X		
	§ effectiveness of student performance assessment procedures	X		
	§ students' expectations, needs and satisfaction with the programme	X		
	§ the learning environment and support services and their conformity with the programme's goal	X		

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

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

Financial resources according to politics, strategy and tactics of LLU financial management are handled by LLU Financial Planning Centre which plans the financial work according to LR laws and other regulatory documents governing the financial management. Every year LLU Senate approves LLU joint budget revenue and expenditure distribution and budget which is prepared according to the (annual) [Law On the State Budget](#) (only in Latvian) adopted by the Saeima. Budget control and audit is conducted by independent group of auditors whose summary report is also approved by LLU Senate. Before confirmation of joint budget estimate in the LLU Senate, finance planning and results are discussed and updated by the Work Group in Matters of Resource Utilisation approved with a rector's order, where deans of all faculties, chancellor, rector, science vice-rector, study vice-rector, head of the resource accounting centre, economist, lawyer and head of Financial Centre are included.

The main sections of LLU joint budget revenue and expenditure for 2021 are:

- national budget transfer for study process - 10,811,141 EUR of which 8,397,644 EUR for salaries, 862,468 for scholarships, 1,551,029 for covering total costs and 513,968 at disposal of LLU faculties;
- LLU tuition fee revenue - 2,080,220 EUR which is distributed for teacher salaries at 1,248,132

EUR, covering of total expenditure 416,044, and at disposal of all LLU faculties 416,044 EUR;

- Science revenue / expenditure makes 15,291,570 EUR of which 1,044,855 is basic funding for science, 468,798 EUR performance funding and 5,658,201 EUR other scientific projects;
- ERASMUS revenue / expenditure makes 428,970 EUR;
- Received donations 10,000 EUR.

LLU Senate has approved a procedure for proportional budget revenue / expenditure which stipulates that 80% of state funding granted for studies make salary expenditure and 20% - other costs. 60% of funds from paid studies are spent for covering remuneration costs and 40% - for other costs, 20% of which are in direct control of the Faculty delivering the relevant study programme for covering expenditure and 20% for covering centralised expenditure. Scientific base funding, amounting to 50%, is at direct disposal of the Faculty, and 50% are intended for covering costs centrally.

The number of state-funded study places is coordinated in a tripartite agreement between the Ministry of Education and Science, the Ministry of Agriculture and the Latvia University of Life Sciences and Technologies. The tripartite agreement specifies the basic costs of one study place, social security costs of the study place, study level coefficient, study cost coefficients of the thematic field of education, and provision of the study cost coefficient as a percentage.

State funding by year

Bachelor's program "Agricultural Engineering"

The 2021 year tripartite agreement on state funding for study programs stipulates that the basic costs of one study place are 1630.11 EUR, the study level coefficient for bachelor's programs is 1 and the social security of the study place for bachelor's programs is 164.34 EUR, the study cost coefficient for the bachelor's program "Agricultural Engineering" is 1.7, the cost per student in the bachelor program "Agricultural Engineering" is 2935.52 EUR.

In 2020 - basic costs of one study place: 1518.98 EUR, cost per student: 2746.15 EUR, in 2019 1518.98 EUR and 2745.96 EUR, respectively, in 2018 - 1458.51 EUR and 2642.76 EUR, in 2017 - 1393.33 EUR and 2532.81 EUR, in 2016 - 1333.11 EUR and 2078.35 EUR, in 2015 - 1333.11 EUR and 2078.46 EUR, in 2014 - 1333.11 EUR and 2061.89 EUR, in 2013 - 1333.36 EUR and 2068.12 EUR.

Master's program "Agricultural Engineering"

The 2021 tripartite agreement on state funding for study programs stipulates that the basic costs of one study place are 1630.11 EUR, the study level coefficient for master's programs is 1.5 and the social security of the study place for master's programs is 164.34 EUR, the study costs coefficient for the master's program "Agricultural Engineering" is 1.7, the cost per student in the master's program "Agricultural Engineering" is 4321.10 EUR.

In 2020 - basic costs of one study place: 1518.98 EUR, costs per student: 4037.07 EUR, in 2019 1518.98 EUR and 4036.77 EUR, respectively, in 2018 - 1458.51 EUR and 3881.96 EUR, in 2017 - 1393.33 EUR and 3717.06 EUR, in 2016 - 1333.11 EUR and 3035.36 EUR, in 2015 - 1333.11 EUR and 3035.51 EUR, in 2014 - 1333.11 EUR and 3010.66 EUR, in 2013 - 1333.36 EUR and 3032.28 EUR.

Doctoral program "Agricultural Engineering"

The 2021 tripartite agreement on state funding for study programs stipulates that the basic cost of one study place is 1630.11 EUR, the study level coefficient for doctoral programs is 3 and the social security of the study place for doctoral programs is 1009.53 EUR, the study cost coefficient for the

doctoral program “Agricultural engineering” is 1.85, the cost per student in the doctoral program “Agricultural Engineering” is 10043.80 EUR.

The 2020 tripartite agreement on state funding for study programs stipulates that the basic cost of one study place is 1518.98 EUR, the study level coefficient for doctoral programs is 3 and the social security of the study place for doctoral programs is 2034 EUR, the study cost coefficient for the doctoral program “Agricultural Engineering” is 1.7, the cost per student in the doctoral program “Agricultural Engineering” is 9779.46 EUR.

In 2019 – base costs of one study place: 1518.98 EUR, costs per student: 9778.85 EUR, in 2018 1458.51 EUR and 9469.23 EUR, respectively, in 2017 – 1393.33 EUR and 9139.38 EUR, in 2016 – 1333.11 EUR and 7776.00 EUR, in 2015 – 1333.11 EUR and 7776.36 EUR, in 2014 – 1333.11 EUR and 7726.64 EUR, in 2013 – 1333.36 EUR and 7515.26 EUR.

Bachelor’s program **“Machine Design and Manufacturing”**

The 2021 tripartite agreement on state funding for study programs stipulates that the basic cost of one study place is 1630.11 EUR, the study level coefficient for bachelor’s programs is 1 and the social security of the study place for bachelor’s programs is 164.34 EUR, the study cost coefficient for education thematic area is for the professional bachelor’s program “Machine Design and Manufacturing” is 1.7, costs per student in the bachelor’s program “Machine Design and Manufacturing” is 2935.52 EUR.

In 2020 – basic costs of one study place: 1518.98 EUR, costs per student: 2746.16 EUR, in 2019 1518.98 EUR and 2745.97 EUR, respectively, in 2018 – 1458.51 EUR and 2642.76 EUR, in 2017 – 1393.33 EUR and 2532.81 EUR, in 2016 – 1333.11 EUR and 2078.35 EUR, in 2015 – 1333.11 EUR and 2078.46 EUR, in 2014 – 1333.11 EUR and 2061.89 EUR, in 2013 – 1333.36 EUR and 2068.12 EUR.

Total revenue makes both LLU joint budget and, according to distribution, faculty estimates where utilisation of revenue / expenditure by the goal and also expenditure by the goal and also expenditure is designed. The major specific weight of TF estimate in 2021 comprises:

- Products and services equalling 61%, of which the most important are 39% electricity, sewerage, heating, waste management costs, 12% premises maintenance costs, 10% equipment maintenance costs;
- 12% of it make refurbishment of premises and computer repair, technical servicing, maintenance of copy machines, maintenance of security devices etc.;
- 11% comprises costs of other LLU structural units – transport services, science and technology centre services, warehouse services, plumbing services, services of communication centre, communication services etc.;
- 8% of the faculty estimate comprise office goods and office expenses and also periodicals subscribed for by the study and science centre, teaching materials, text-books, e-materials, databases, manuals.

Total revenue of the faculty is reflected in the annual strategy report of the faculty which is presented to the Faculty Council.

Tuition fee in LLU is approved on a yearly basis in June with a rector’s order. The following tuition fees are determined for academic year of 2020/2021 (rector’s order No. 4.3-8/62 of 15.06.2020):

Table 2.10

Tuition fee for study direction programmes in academic year of 2020/2021, EUR

Study levels and programme	Full-time studies	Part-time studies
<i>Undergraduate studies</i>		
Agricultural Engineering	1900	1300
Machine Designing and Production	1900	1300
Biosystem Machinery and Technologies (in English)	3000	-
<i>Graduate studies</i>		
Agricultural Engineering	2140	-
<i>Doctoral Studies</i>		
Agricultural Engineering	2440	1800

The science funding comprises the funding attracted to projects intended for implementation of certain scientific and research projects, salaries for researchers and leading researchers in the project, as well as for performing certain project-related tasks. Meanwhile, the funding of scientific base, which is obtained on the basis of scientific activity, is distributed according to leading researchers and researchers' scientific performance. According to the Resolution No. 20-13 of LLU Science Council *On confirmation of evaluation procedure for efficiency of LLU academic staff, leading researcher, researcher and scientific assistants* utilisation of the basic funding of science is as follows: (1) by determining the contribution of each leading researcher and researcher, expressed in points and creating the scientific performance in points; (2) when creating the necessary co-funding volume for projects; (3) by supporting creation of an infrastructure of science; (4) by reserving co-funding for scientific activities; (5) by supporting the leading researchers and researchers for their scientific activity – conference attendance, publication costs, participation in scientific symposiums etc. The scientific base funding and performance funding received by the faculty are collected in Table 2.11.

Table 2.11

The basic funding of science obtained by TF and performance funding by years, EUR

Year	Basic funding of science	Performance funding
2016	94 115	-
2017	84 568	58 519
2018	78 826	48 737
2019	87 292	45341
2020	93 594	44 200

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

The studies in the study direction mainly take place in the premises of the Technical Faculty in Jelgava, 5 Bvd. J. Čakste where there are 17 classrooms, 34 study labs with total area of 7,123 m². All classrooms have stationary projector or TV set for teaching purposes. 32 printing machines and 16 copying machines, 21 laptops are available in TF. Students have seven specialised computer classes with 72 places. Materially technical base available in the classrooms and laboratories is renewed and supplemented every year to an extent the funding allows it.

The most crucial materially technical provision for study direction and related programmes that is available to students is collected in Annex II-3.1-1. Materially technical provision of some study direction's programmes is shown in Section 3 *Study programme resources and provision* of each programme description. Most part of materially technical provision intended for studies in the reporting period have been bought within the framework of structural fund projects *LLU STEM Study Programme Modernisation* (only in Latvian) and *LLU Study Infrastructure Modernisation*. Entire provision listed in the annex is at the disposal of university for delivering of study direction's programmes and also of students and academic staff. An overview of study [process](#) and also materially technical base can be obtained on faculty's website. Teaching [aids](#) (only in Latvian) prepared previously within the framework of structural funds are shown in the faculty's website.

A significant contribution to supplementing and modernisation of material base of the studies was made by entrepreneurs. This way [tractors](#) CASE IH (only in Latvian), and modern animal husbandry equipment study laboratory was bought with an impressive support from company *DeLaval* and 12 modern motor vehicle training [test benches](#) (only in Latvian) were obtained with a support of SIA *Armgate*. The faculty obtained many smaller measuring and laboratory equipment with a support from entrepreneurs, the faculty's website has a [list](#) of patrons and supporters. [Website](#) of Agricultural Machinery Institute states gratitude to the supporters.

Joint materially technical base of LLU and study and science materially technical base of other faculties is used for delivery of the programmes contained in study direction.

- in the Faculty of Agriculture;
- in the Forest Faculty;
- in the Faculty of Environment and Construction Sciences;
- In the Faculty of Information Technologies;
- In the Faculty of Food Technology;
- in the Faculty of Economics and Social Development;
- in LLU Sports Centre, where there is also a swimming pool, etc.

Classrooms of all faculties are equipped with audio and video equipment (for example, computers, projectors, screens for showing lecture materials, interactive whiteboards, blackboards).

Students and academic staff members have access to Technology and Knowledge Transfer

[department](#) (TEPEK) (only in Latvian), goal of which is to promote protection of intellectual property of scientists and companies and commercialisation of the research results in LLU. To survey the existing and purposefully develop the necessary research competence in LLU in a systemic manner.

Students and academic staff members may use the services of student hotels. LLU offers services of seven student hotels – situated at [Lielā Street 1](#), [Pētera Street 1](#), [Lielā Street 19](#), [K.Helmaņa Street 2](#) (only in Latvian).

Students and university lecturers can use services offered by LLU Sports [Centre](#), (only in Latvian) which is situated at 1 Street Raiņa, Jelgava.

The modern and spacious LLU [library](#) is suitable for studies.

In all LLU faculties and other LLU buildings students, academic staff and guests have Wi-Fi connection.

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

System of methodological and information resources

The main goal of LLU with regard to the library collection is to provide the programmes with literature and learning materials. The Fundamental Library of LLU (hereinafter – the LLU FB) is an accredited library of national significance, which provides users with information resources.

The LLU FB aims to provide library users with information resources and services necessary for the learning process and scientific research. In order to ensure student-focused and up-to-date access to library resources for students, academic and research personnel, an information and methodological support system consisting of five mutually subordinate components has been established:

1. LLU FB documents governing the functioning of the information and methodological system;
2. administration and structure of the information and methodological system;
3. procedures for acquiring information and methodological resources;
4. basic processes of the information and methodological system;
5. the way the information and methodological system is funded.

The [Statute](#) of the LLU Fundamental Library specifies the principles of functioning of the LLU FB as well as the obligations, rights and liability.

The [Rules](#) for Using the LLU FB (only in Latvian) govern the general operational principles of the library, the acquisition of library user status and the exclusion from the list of library users.

Information, research and communication contact points have been established in some Faculties to ensure a student-focused and more accessible learning process:

- *Faculty of Economics and Social Development: the **Centre for Studies and Science Information***;
- Institute of Social and Human Sciences: the Methodology Office;
- Faculty of Environment and Civil Engineering: the Information Centre;
- Forest Faculty: the Information Centre;
- Institute of Education and Home Economics of the Faculty of Engineering: the Information Centre;
- Faculty of Veterinary Medicine: the Information Centre.

The resources available at the above-mentioned centres are associated with the LLU FB, as the resources could be accessed through the LLU FB [website](#).

The library collection is supplemented based mostly on recommendations of teaching personnel. The Library Request Form is available on the Library's website. Based on the requests of teaching personnel and other users of the library, the LLU FB purchases the requested publications. The LLU FB has developed a Collection Supplementation Policy, which states that the main priority is placed on the programmes delivered at and the research fields of LLU. In accordance with the Legal Deposit Law, the LLU FB, as a library of national significance, receives one copy from each printed and electronic publication in the LLU profile area.

Accessibility of the library online

The LLU FB provides library users with the literature or information necessary for teaching, research, scientific and consultative activities. The library collection is constantly supplemented to meet the needs of the study directions.

Industry publications for studies and research are **available**:

- at the Lending point;
- at the Textbook Lending point;
- at the library reading room;
- at the FAO Depository Library (United Nations);
- factual and bibliographic references on related topics could be obtained from the Bibliographic Information [Division](#) (only in Latvian).

The sources of information that are not available in the library collection could be searched for through LLU network-subscribed databases or outside the LLU network through the LLU Information System, at the LLU Fundamental Library Reference and Information Centre, or **interlibrary loan services** could be used.

Information on the breakdown of the library's collection by science (% of the total collection) could be found at [FB website](#).

The library's opening hours are tailored to the needs of the library's main users – students and teaching personnel. On weekdays, the **library is open** to its users from 8.30 to 19.00, on Fridays – from 8.30 to 17.00. The library is also open to the public on the first Saturday of every month, from 9.00 to 14.00. The working hours of the library's reading room and Reference and Information Centre during the period of individual studies and examinations are extended to 24.00. The catalogue and online databases are accessible all the time. During the COVID-19 pandemic, the

library also [works remotely](#) (only in Latvian).

In order to make the library suitable for independent and research work, the LLU FB reader service total **area** is 787.1 m². The reading room has comfortable workspaces both in the hall and on the balcony. The Internet and Wi-Fi are available. The reading room has also a lounge with comfortable sofas. There is also the quiet reading room. The Reference and Information Centre has desktop computers and provide qualified consultant services.

Accessibility elements for persons with disabilities have been built in the LLU FB:

- signs with a schematic layout of the building and the location of a lift are available on the building wall;
- the building has a lift;
- specially equipped amenities have been built for persons with reduced mobility;
- signs for finding a room;
- marked stairs;
- the building could be entered with a guide dog.

Library in the digital environment - databases and search engines

The LLU FB offers its users various online databases and databases on other data carriers. Before being offered to users, databases are analysed for search capabilities, thematic coverage, chronological coverage, and access capabilities to meet the needs of the study directions. Information on the databases and their descriptions are placed on the LLU FB website.

The library has purchased the search engine PRIMO DISCOVERY, which enables users to simultaneously search for information in subscribed and open access online databases, in the Electronic Joint Catalogue of libraries of national significance and in the databases created by the LLU FB (research papers by LLU teaching personnel and researchers, LLU master theses, etc.). Registering with an LLU IS user account allows the users to view their user accounts and extend expiration dates for borrowed items, order publications, access full texts in subscribed online databases and save the search results. The library's website provides the PRIMO Information Search Assistant. Access to online databases is provided 24/7 on the LLU network, and there is an opportunity to connect to subscribed e-journal and e-book databases outside the LLU network by using the LLU IS user account or EZproxy and the LLU IS user account.

The LLU FB users have an opportunity to search for information in the following subscribed foreign and national online databases:

- *CAB Abstracts*,
- *CRC Presse-books*,
- *EBSCO eBook Academic Collection* database covering a wide range of multidisciplinary topics and containing more than 228515 e-books,
- *EBSCO hostdatabases Academic Search Complete, MasterFILE Premier* and others,
- *ScienceDirect Journals*,
- *Scopus*,
- *SciVal*,
- *Web of Science*,
- *Wiley Online Journals*,
- *Lursoft*.

The intensity of use of foreign databases subscribed by the LLU FB has been summarized by analysing the databases available to students, academic and research personnel in the relevant field and their usage statistics. As of 1 January 2021, the total **number of connection**

sessions was 73.6 thousand, the **number of searches** was 408.7 thousand. The most popular database for users in terms of number of sessions was EBSCO and ScienceDirect Journal, while in terms of number of searches – Britannica and EBSCO.

In cooperation with the Cultural Information System Centre, various online databases are periodically available for trial for information search purposes.

The **databases** created by the personnel of the LLU FB are also offered to readers:

- research papers by LLU teaching and research personnel;
- doctoral dissertations defended at LLU;
- conference proceedings of LLU;
- patent research papers by LLU teaching and research personnel;
- publications on LLU.

The LLU FB as a depositary library of the FAO and the national AGRIS centre takes part in developing the international AGRIS database.

Services offered by the library

The following **free-of-charge** services are available at the LLU FB:

- use of computers with access to the Internet and Wi-Fi;
- an opportunity to use Autodesk EDU Master Suite 2018 (AutoCAD, AutoCAD Structural Detailing, Autodesk Robot Structural Analysis Professional, etc.), CorelDRAW X7, SPSS Statistics v21 and VISIO 2013;
- 4/7 access to library-based, subscribed and free online databases;
- borrowing of books, periodicals and other documents;
- training in use of full-text and bibliographic databases, a computer and the Internet;
- training for LLU teaching personnel, including online, in how to search for and retrieve information, create a personal account, add research papers from the LLU teaching personnel and researcher research paper database to the LLU IS personal account, use Mendeley, create a researcher identification number ORCID and research ID etc.;
- classes for doctoral, master and bachelor students, including in English;
- instructional aids for each target audience (scientists, students, other users) that are sent them on request;
- provision of references and advice on the library and its use;
- editing of bibliographies, a delivery of examples of a bibliographical description on request via e-mail;
- tailor-made exhibitions.

The following **paid** services are offered by the LLU FB:

- copying (colored, black and white),
- printing (colored, black and white),
- scanning,
- provision of written thematic references,
- SBA and SSBA services (costs of postal services must be covered),
- delivery of copies of documents (at the supplier's price),
- spiral binding.

The library offers the following **e-services**:

- use of the electronic catalogue 24/7,
- electronic book reservation, expiration date extension for borrowed items 24/7,
- use of the unified search engine PRIMO DISCOVERY,
- 24/7 access to library-based, subscribed and free online databases (both full-text and bibliographic),
- an opportunity to connect to subscribed e-journal and e-book databases outside the LLU network by using EZproxy and the LLU IS user account 24/7,
- use of Mendeley – a scientific information search application,
- an opportunity to use other online information resources from the library website,
- access to the electronic catalogues of the LLU Information Centres and Information Offices (BIS ALEPH500),
- an opportunity to use instructional materials on information resources, available on the library website, that have been prepared either by the LLU FB or by database maintainers,
- an electronic delivery of documents,
- “Write to the Librarian” on Skype,
- a Book Request Form on the library’s website.

Financing of information and methodological resources and the number of publications available

The funds of the **LLU FB** are an independent part of the LLU budget. The property of the LLU FB is the property of LLU and the LLU FB is directly subordinated to the vice rector for studies. The funds invested in the development of the LLU FB increased every year and reached **EUR 103 892** in 2018: purchases of books totaled – EUR 30 092, subscriptions to databases – EUR 64 179, periodicals – EUR 9621 and ALEPH – EUR 7664. As at 31 December 2018, the total collection of the LLU FB reached 406 593 copies and 123 949 **titles**.

The LLU FB collection contains 3728 *various publications*: scientific monographs, books, proceedings of scientific research papers, results of scientific research, etc. for the needs of implementation of the programmes contained in the study direction. In the reporting period (2013-2019), the number of titles of publications has increased by 272, of which 179 or 63.5% are in foreign languages.

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

At LLU, the attraction and employment of teaching personnel (incl. job vacancy announcement, recruitment, election etc.) is governed by the *Statute (only in Latvian) of Latvia University of Life Sciences and Technologies on Academic Job Positions* approved by the LLU Senate.

The number of positions of professors, associate professors and assistant professors in the relevant branches and sub-branches of science is determined by financial possibilities and the need for research activities and programmes as well as according to the personnel development plans of the Faculties. The number and positions of academic personnel are approved by the Boards of the Faculties, the Council for Studies, the Science of Council and the LLU Senate. Open academic positions are filled on an open competitive basis.

The general requirements, rights and obligations of applicants for academic positions are stipulated by the [Law](#) on Higher Education Institutions, Part IV, which defines the tasks to be performed by each group of academic personnel and the procedure for assessment of scientific and pedagogical qualifications.

All applicants for academic positions have to meet the following requirements:

- knowledge of the official language in accordance with the requirements of the regulatory framework;
- knowledge of foreign languages to the extent required for fulfilling duties of the academic position (including conducting classes in these languages);
- continuous improvement of their academic and scientific qualifications.

The selection of academic personnel is governed by the [Statute](#) (only in Latvian) of Latvia University of Life Sciences and Technologies on Academic Job Positions. Based on the information received from the organisational units of LLU on vacant academic positions, the LLU Personnel Department prepares a draft advertisement and submits it to the LLU Commission for Academic Personnel and Structural Policy for review (hereinafter – the Commission). Following the decision of the Commission, the Personnel Department prepares a draft proposal for vacant academic positions and submits it for consideration to the LLU Council for Studies or the LLU Council of Science, which forwards it to the LLU Senate for approval. Following the decision of the LLU Senate, the Personnel Department announces an open competition for vacant academic positions by publishing an advertisement in the newspaper *Latvijas Vēstnesis* (Latvian Herald) and on the LLU website.

According to the electoral procedure, the election of a candidate to the academic position is done by secret ballot: professors and associate professors are elected by the Board of Professors of the relevant branch of science not later than four months from the date of invitation to the competition; assistant professors, leading researchers, researchers, lecturers, assistants and research assistants are elected by the Boards of the Faculties not later than three months from the date of announcement of the competition.

The Rector concludes an employment contract with the person elected for the term of office.

If LLU has a vacant academic position, the LLU Senate, based on the proposal of the Board of the Faculty, may decide not to announce the competition. In this case, the Rector may enter into a contract with a visiting professor, a visiting associate professor, a visiting assistant professor, a visiting lecturer or a visiting assistant for a fixed period of up to two years.

In accordance with the rector's ordinance On the Procedure of Recruitment of Foreign Visiting Lecturers, the LLU has developed a procedure for recruitment of foreign visiting lecturers. The procedure stipulates that a visiting lecturer may be invited by the responsible Faculty, or a foreign visiting lecturer has expressed a wish to carry out pedagogical /scientific activity at LLU.

The responsible Faculty assigns a course or research and pedagogical tasks to the foreign visiting lecturer that correspond to his/her competences. A legal employment relationship is established with the foreign visiting lecturer.

Academic personnel is hired on a full-time or part-time basis, depending on the individual academic workload, which is planned for each academic year in accordance with the LLU Statute on Academic Workloads and the rector's ordinance On the Planning, Accounting for and Control of Individual Workloads of Academic Personnel, which defines the components of workload of academic personnel, workload rates and the procedures of accounting for and control of the workload.

Salaries for academic personnel are determined in accordance with the Cabinet regulation *Regulations regarding [Remuneration](#) for Pedagogues* and the rector's ordinance *On Remuneration*

for Pedagogues.

Academic personnel professional development involves participation in appropriate professional development programmes, exchange of experience and participation in conferences and seminars, as evidenced by the documents issued upon the completion. Every six years, academic personnel are entitled to six-month paid academic leave for research or for research activities outside their workplace. The procedure for professional development to be performed is stipulated by the Cabinet [regulation](#) (only in Latvian) ication through continuing education in professional development programmes on innovations in the higher education system, university didactics or educational work management, 160 academic hours in length (including at least 60 contact hours), prior to the end of the term of office. LLU implements the professional development [programme](#) (only in Latvian) for higher education pedagogues *Innovations in University Didactics*. The aim of the programme is to build up higher education pedagogues' knowledge of university didactics and possibilities of its application in pedagogical activity. Upon completion of this programme, a certificate is awarded.

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

Requirements for academic positions are prescribed by the [Law on Higher Education Institutions](#) of the Republic of Latvia. Qualifications of teaching personnel are stipulated by the [Statute](#) of Latvia University of Life Sciences and Technologies (only in Latvian) on Academic Positions. The statute prescribes the qualifications to be possessed by elected academic personnel for each kind of positions. The teaching personnel who are not elected at the relevant organisational unit need to meet the same requirements and have the same qualifications as those of the same academic level. The mentioned requirements are in accordance with the current regulatory framework of the Republic of Latvia that clearly specifies criteria for teaching personnel taking a particular academic position.

LLU has identified and described processes that contribute to the qualifications and work quality of teaching personnel. One of them is the process of **election and re-election of academic personnel**. It allows assessing the work quality of teaching personnel in the previous period and determining their eligibility for the positions for which they are applying (lecturer, assistant professor, associate professor or professor), and their compliance with the work quality criteria set by the regulatory frameworks of the Republic of Latvia and LLU. Professors and associate professors have to meet the unified national requirements for assessment of their scientific and pedagogical qualifications in accordance with Cabinet [Regulation](#) No 129 of 25 February 2021 (only in Latvian). The procedure of assessment of scientific and pedagogical qualifications of a professor and an associate professor is intended to assess his/her scientific qualification achievements according to 9 criteria and pedagogical qualifications - 9 criteria.

To contribute to continuous professional development in higher education didactics, LLU delivers

the **professional development programme for higher education pedagogues** Innovations in University Didactics (160 h) that has to be taken by the academic personnel of LLU every six years. Since 2017, LLU has introduced a **motivation system for teaching personnel** (LLU rector ordinance No.43-8/10), thereby achieving the objective set by the LLU Development Strategy 2015-2020 – to update the motivation system for teaching personnel. The motivation system assesses the teaching personnel according to 14 criteria, which are divided into 5 categories: student assessment; preparation of teaching aids; learning process; organisational work; and professional development. The established motivation system allows earning an extra bonus for high-quality work. The quality assessment points obtained by a teaching personnel member are summed up, and each criterion is assigned a weight. The LLU Financial Planning Centre calculates the size of a bonus for each teaching personnel member based on the total score earned. This system allows the quality of teaching personnel to be assessed and the personnel to be rewarded according to uniform and comparable criteria. Teaching personnel are very positive about this system, which motivates them to raise the quality of their work. Another very important assessment of teaching personnel' work quality is **student surveys**. At the end of each semester, each teaching personnel member's work is assessed by students. Students make this assessment anonymously, electronically in the LLU IS. Students assess the work of their teaching personnel by answering six questions and giving ratings on a 5-point scale, with 5 points being very high and one point – very low. The ratings given by students are electronically available to each teaching personnel member who delivers a course, as well as to the director of the relevant programme and the director of the institute involved in the delivery of the programme. The programme director and the director of the institute take the ratings into account as far as possible when planning the work of teaching personnel for the next year. Based on the ratings, any teaching personnel member is encouraged to improve the performance and eliminate shortcomings in his/her work.

Since February 2019, in accordance with Council for Studies decision No. 2.4-14/2, LLU has introduced a unified class hospitation procedure, which is intended for the control of delivery of classes and exchange of experience. Hospitation is carried out by the programme director, the director of the institute or other LLU teaching personnel members. The teaching personnel who had been given suggestions or recommendations for improvement of their classes after the hospitation have to provide information about the improvement activities done (or planned). The hospitation practice introduced allows assessing and improving the work quality of academic personnel, making suggestions for the improvement and controlling the progress.

The opportunities offered by LLU to raise the qualifications of its teaching personnel are provided through several measures: 1) ERASMUS + mobility programme, which allows for the exchange of experience; 2) participation in international scientific conferences and seminars is funded within financial possibilities; 3) the annual LLU Academic Conference aiming to encourage teaching personnel to systematically develop their didactic competence and share their success with their colleagues has been held (since 1981). The LLU Language Centre offers an English language course (32 h) to university teaching personnel. Since 2010, LLU has been providing a professional development course Moodle e-Course Creation Management System.

Since 1998, LLU has been holding an annual contest of textbooks and teaching materials to promote the publication of new, original textbooks and teaching materials needed for the implementation of LLU courses. Textbooks and teaching materials for the contest are submitted by LLU teaching personnel to the Assessment Committee approved by the rector's ordinance. In the reporting period (2013-2020), 96 works were submitted to the contest.

Teaching personnel have an opportunity to participate in international scholarship contests and EU-funded projects aimed at raising the qualifications of teaching personnel through acquiring new knowledge and skills. LLU implements the following ESF projects: No. 8.2.2.0/18/A/014

Development of LLU Academic Personnel (only in Latvian), with the aim of raising the quality of the learning process through enhancing the competencies of the personnel and collaboration with industry and engaging doctoral students as well as foreign academic personnel; No. 8.2.3.0/18/A/009 *Enhancement of the Governance* (only in Latvian) of Latvia University of Life Sciences and Technologies, which intends to enhance the quality of the curricula of LLU programmes and, by making effective use of the resources available, to ensure better governance of the university and build up the competencies and skills of its administrative management personnel. The personnel engaged in the study direction are involved in implementing these projects. For example, in the academic year 2019/2020, within project No. 8.2.2.0/18/A/014, professional English was studied by 7 teaching personnel members, 9 members were provided with internships in companies of the branch. The project involves new doctoral students and foreign professors.

The teaching personnel engaged in the programmes of the study direction actively use and appreciate the opportunities offered by the university and the Faculty to build up their qualifications. The opportunities used result in updating syllabuses of the courses taught and enhancing the delivery of the courses technically, as the teaching personnel incorporate new techniques in their courses and apply them in their work. They learn the latest scientific findings, which are used to build up their professional skills and competences, and the overall quality of the programmes increases. Most of the teaching personnel participate in the decision-making body of TF - the Board - and in the Methodological Committees of the Faculties, thereby applying their experience in achieving the overall strategy of TF and organising the work process. Skills development provides an opportunity for teaching personnel to progress in their academic and research careers, be engaged in higher-level programmes and receive higher remuneration for higher-quality work.

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

There are 81 academic staff members involved in delivery of the study direction in academic year of 2020/2021, total number of them somewhat fluctuated between 80 and 93 over last six years. According to LLU academic work calculation for academic year of 2020/2021, the academic load of 22.48 positions for academic staff members involved in the study direction, the major part 18.04 of the workload is found in undergraduate study programme. Both elected and non-elected academic staff members participate in delivery of the study direction. The elected academic staff members in undergraduate studies comprise 63%, graduate studies - 72% and doctoral studies - 98%. Total number of academic work hours for the academic staff members in the study direction in one academic year is 20,948 hours, of which: professors - 5736.52 (27.4%); associated professors - 3629.18 (17.3%); university lecturers - 3754.58 (17.9%); lecturers - 7772.02 (37.1%) and assistants - 55.77 (0.3%). Proportional distribution of such academic positions in general corresponds to LLU staff provision policy.

The academic staff members of the study direction are also employed in science, in academic year of 2019/2020 the load of all academic staff members comprised 23.66 full-time equivalents.

Academic staff mobility for academic staff members involved in the study direction is relatively active, especially by using ERASMUS+ possibilities. Up to three academic staff members of the study direction read lectures in higher education institutions abroad over last five years and 2-3 academic staff members engage in experience exchange. Academic staff members go to read lectures for students of other higher education institutions in different countries; in academic year of 2019/2020 these were three countries, while experience was obtained in higher education institutions of Estonia, Poland, Lithuania, Turkey, Germany, Czech Republic, Slovakia and Malta. The incoming mobility of academic staff members in the study direction was particularly enhanced by traditional international scientific [conference](#) Engineering for Rural Development where many similar profile higher education institution academic staff members participate, 1-2 academic staff members on average, are engaged during the academic year as visiting lecturers.

In spring semester of 2019, an academic staff member from TF Motor Vehicles Institute delivered lectures in Czech University of Life Sciences. Within the framework of ERASMUS+ programme the associated professor read lectures in Jan Evangelista Purkyně University in Ústí nad Labem (Czech Republic) on topic: “Biofuels for Internal Combustion Engines”, and also delivered a lecture course in volume of 24 h to students at Klaipeda University of Applied Sciences (Lithuania) within the framework of a programme of The Ministry of Education and Science of the Republic of Lithuania.

In spring semester 2020, a [visiting professor](#) (only in Latvian) from Kazimierz Pułaski University of Technology and Humanities in Radom (Poland) read lectures and prepared study materials about INDUSTRY 4 concept for students of programme Machine Designing and Production.

The incoming and outgoing mobility has positive effects on mutual contacts, cross-university cooperation, there are no difficulties found in the academic staff mobility. The mobility allowed the academic staff members to learn new insights and new methods which they use for their work as academic staff, they have found cooperation partners for research projects and successfully implemented them, and also led to joint scientific publications. For example, joint publications with colleagues from universities of other higher education institutions, for example, from Vytautas Magnus University Agriculture Academy (prof. A.Ābolģiņš in 2020 co-authored in [publications](#) with [E.Jotautiene](#) and [colleagues](#) from J. E. Purkyne University in Usti nad Labem in Czech Republic) were created. Academic staff mobility allows promoting their university, faculty, which in turn sparks interest in foreign students to use possibilities of ERASMUS+ in LLU.

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

Financial support

Financial support in the form of [scholarships](#) (only in Latvian) is available to students during their studies. On a complete basis, students may apply for:

1. State scholarship – monthly bachelor’s and master’s scholarship is EUR 99.60, for doctoral studies – EUR 113.83;
2. One-time scholarship – during the semester, students may apply for one-time scholarship in the amount of two minimum scholarships;
3. Scholarship for acquiring a scientific degree – EUR 85.37 – in the form of a loan.

In addition, the LLU Development Fund offers students a total of 18 scholarship programmes (only in Latvian) ranging from EUR 40 to 1500. The scholarships are both monthly and one-time. Students of the programmes of the study direction may participate in the following scholarship contests:

- bachelor students – 6 scholarship programmes: the Kārlis Ulmanis Scholarship, the LLU Senate Scholarship, the Janis Čakste Scholarship, the Jānis and Millija Kāvuši Scholarship, the Mirdza Oškālnie Scholarship, the LLU Student Self-government Scholarship, the Jānis Vanags Scholarship and the Pēteris Birkerts Scholarship);
- master students – 6 scholarship programmes: the Kārlis Ulmanis Scholarship, the LLU Senate Scholarship, the Janis Čakste Scholarship, the Jānis and Millija Kāvuši Scholarship, the Mirdza Oškālnie Scholarship and the Latvian Agricultural Cooperatives Association Scholarship).

Tuition fee relief for students

In accordance with LLU rector ordinance No. 4.3.-8./12 of 21 February 2018 Procedure of Granting Tuition Fee Relief to Students, (50-100%) relief may be granted to the following categories of **non-failing students**:

1. working employees of LLU who are enrolled on a doctoral programme;
2. LLU employees' children aged under 24 years of age;
3. persons with Group I or Group II disability who study full-time or part-time in bachelor or master programmes;
4. orphans or persons without parental care;
5. students being sportspersons (team members or candidates of the Republic of Latvia; if the team has a cooperation agreement with LLU and the team name includes the abbreviation LLU).

Support for foreign students

LLU provides support to students from abroad in relation to the following issues:

1. Foreign students apply for studies via the e-admission system Dream Apply, which provides partially formalized admission procedures, thereby significantly facilitating communication with LLU;
2. Coordinators of the International Cooperation Centre (SSC) individually answer specific questions of the applicants.
3. Any foreign student is provided with a room in a well-equipped student hostel.
4. To introduce foreign students to LLU and the learning and living environments and the Latvian cultural environment, a Welcome Week is organised in the first week of each semester, during which student consolidation events are held.
5. The LLU SSC provides technical support regarding acquiring/extending visas, residence permits as well as insurance.
6. The LLU SSC and foreign relations coordinators of the Faculties, as well as programme directors inform students from abroad about the internal rules of LLU and the relevant practices, give advice on learning and everyday life issues, help with paperwork and help to solve various problems.
7. There is an Erasmus Student Network group at LLU, as well as the LLU Student Self-government, which organises leisure and cultural activities for students.
8. LLU foreign relations coordinators inform foreign students about available health care by family physicians and at the Jelgava Polyclinic and, if necessary, perform the functions of an attendant.
9. Every semester, starting with the academic year 2019/2020, a survey of foreign students on the courses delivered is conducted, which reveals their satisfaction with the quality of the

courses.

The **LLU Lifelong Education Centre** has active volunteer students who unite to develop their organisational and managerial skills, teamwork skills, critical and creative thinking, change management skills and teamwork skills. The League of Excellent Students has been established to represent TF and LLU at various events, exhibitions, promotional events etc. – from 2014 to 2019, 9 students represented TF. The LLU Lifelong Education Centre has created a system for taking courses as listeners, which is open to anyone interested. In the reporting period (2013-2018), 46 interested individuals used the status of listener. Students are offered various non-formal education courses. In May 2012, LLU introduced a [system](#) (only in Latvian) for recognition of competences acquired outside formal education or through professional experience and learning outcomes achieved in previous education, which has not been used by any student from TF so far.

The **LLU Student Self-government** (LLU SP) is an organisation representing LLU students, which deals with important issues in the students' academic, social, cultural and sports life, represents and defends the students' opinions and rights. The LLU Student Self-government provides significant support for student involvement, adaptation and learning through:

1. Holding an introductory event On the Start Line at LLU for first-year students (freshers) as well as a seminar LLU & CHILL for them, during which the new students get familiarised with the learning environment, the Faculties, each other and later-year students.
2. Holding a seminar Breakthrough, which is open to any LLU student to gain experience in their own growth.
3. Representing LLU students' opinions in the Student Union of Latvia and the Senate, the Council, the Council for Studies and the Maintenance Board of LLU.
4. Holding social events with other HEIs that give students a greater opportunity to get familiarised with future professionals in similar fields.
5. Providing students with an opportunity to relax after their studies by organising educational and reunion events, sporting events as well as informal atmosphere events, e.g. Smart Owls, LLU SP Street Sports Games, FSP Sports Games, Meet & Greet and Loco Fiesto.
6. Participating in events organised by other HEIs, as well as organising events with other HEIs, e.g. KUBS, KRS?
7. Organising an LLU Annual Award contest together with student self-governments of the other Faculties, thereby contributing to communication among the Faculties of LLU.
8. Cooperating with companies in Jelgava City, organising joint events, giving students an opportunity to participate in informal events, e.g. On the Start Line at LLU, Halloween and Unity Trip.

The **LLU Information Technology and Scientific Equipment Centre** provides all students with IT and technical support by providing the following IT support [services](#) (only in Latvian):

- creating an LLU IS user account to provide the student with access to his/her personal and learning assessment data;
- creating a unified e-mail account;
- providing access to the Wi-Fi network;
- providing users with instructions.

All LLU students are provided with technical and methodological support for e-studies by a methodologist of the Centre for Studies (lluestudijas@llu.lv).

The programme directors, directors of the institutes and chief specialists of TF and the personnel of the TF Dean Office provide significant support in the learning process.

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

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

In the study direction the research is conducted in engineering (group II) industries stated in LLU [Strategy](#): energetics, electronics and telecommunication engineering science (2.2), machine sciences (2.3), material science (2.3), environmental engineering science (2.7) and agricultural science discipline: agricultural science (4.1) and animal science (4.2.). The priority research [directions](#) of the study direction are: use of sustainable energy in motor vehicles; smart technologies and robot biosystems; sourcing and use of renewable energy; reduction and rational use of manufacturing by-products and waste. These scientific directions were chosen on the basis of the scientific competence of a study direction, and they comply with the needs of perspective fields of economics within the Latvian Smart Specialisation strategy where Latvia's innovation capacity should be built. The scientific activity goes in two directions – fundamental and applied research. The strategic and long-term research goals for the study direction are determined in the Research [Programme](#) 2015-2020 of the Latvia University of Life Sciences and Technologies (p. 9, hereinafter referred to as – Research Programme), which stipulates a need for excellence in the research, which drives technologies and innovations and are integrated in study process. LLU Research Programme defines accurate, measurable attainable outcomes, for example, number of publications in journals indexed on *SCOPUS* and *WoS*, number of publications in journals, projects supported by Horizon 2020, number of publications where persons from the private sectors are co-authors, funding companies (private) for research. In order attain the results, several action [plans](#) (only in Latvian) have been elaborated at the level of LLU (p. 33): (1) targeted cooperation improvement plan; (2) a plan for participation in EU research and innovation basic programmes Horizon 2020 and other research and innovation support programmes and technology initiative; (3) a plan for increasing the number of international publications; (4) a plan for improvement of knowledge and technologies; (5) a development plan for research human resources which promote common research activities of LLU, including those in the study direction. Progress of science and research activities and assessment of their performance are broken into the tasks of action plans:

1) attraction of new scientists, at the same time promoting the increase of the number of doctoral students:

- Open [selection](#) (only in Latvian) of doctoral students within the framework of the second project submission selection round of 8.2.2. specific support objective *To strengthen the academic staff of higher education institutions in areas of strategic specialisation*, titled *Support for [doctoral students](#) (only in Latvian) to work in the Latvia University of Life Sciences and Technologies*.
- Elaboration of sustainable heating solution in public electric transport salon (ERAF [project](#) (only in Latvian), 2019-2021).

2) to elaborate and implement renewal of research staff (researchers) in directions where the specific weight of researchers aged 60+ exceeds 25% (there are 39 researchers and leading researchers in our direction, 22% of them are older than 60 years).

3) to be aware of international networking possibilities for researcher training and inform researchers about them:

- regular informative seminars are organised - topicalities in international scientific cooperation programmes and projects;
- cooperation agreements were signed (for example, in academic year of 2019/2020 in LLU 42 bilateral cooperation agreements were signed with 22 national universities and scientific institutions), and LLU is a member in 39 international academic institutions' associations or cooperation network.

4) to choose target cooperation partners abroad (incl. outside EU), to carry out preliminary work to build and strengthen cooperation with the selected universities and research institutions (international projects - Eranet, ERAF, territorial cooperation projects, Nordplus, Erasmus+). Within the framework of the direction, good cooperation was developed with: Vytautas Magnus University Agriculture Academy; Klaipeda University, Estonian University of Life Sciences; Czech University of Life Sciences Prague.

5) to continue building and developing a cooperation between companies and researcher groups, to update research, technological development and innovation topics necessary for promoting development of companies, finding solutions for shared projects and implementing other initiatives:

- to ensure participation and promoting of scientific groundwork in various exhibitions and seminars (for example, Tech Industry, Riga Food, Agriculture Machinery. *Rural Yard*. Forest Machinery, Entrepreneurs Days in Zemgale, Metal Festival in Jelgava, Machinery and Innovations Festival Mehatrons, contact exchange Scientist. Entrepreneur. Cooperation and in forums Rural Days etc.);
- to promote active involvement in delivery of cooperation and order contracts. Every year several researches are ordered, for example, in a contracted research: Research of the impact of biodiesel and NExBTL fuel admixture on parameters of vehicle operation; **impact** (only in Latvian) of a new solution on parameters of vehicle operation and emissions; INTENSSS-PA: *Integrated, sustainable energetics **planning*** (only in Latvian); *Impact of fuel **additive*** (only in Latvian) on main operation parameters of a vehicle; *Impact of diesel fuel on the consumption of vehicle **fuel*** (only in Latvian); *Impact of diesel fuel of various content on the **consumption*** (only in Latvian) of vehicle fuel; *Impact of ERT **oil*** (only in Latvian) additive on vehicle performance and emissions; *Impact of diesel fuel additives on **tractor*** (only in Latvian) performance; *Research of the impact of oil additives on **vehicle*** (only in Latvian) performance.

6) to create and introduce a system which provides financial resources for every LLU researcher to publish at least 2 scientific articles in indexed journals included in Scopus or Web of Science databases. It is ensured by performance funding associated with individual achievements and base funding for the results attained by the structural unit. In 2020, a financial support from the base funding was allocated for publishing 10 scientific articles, for example, one article in journal *Agronomy Research* (Vol. 18 (S2), 2020, p. 1418-1423, 300 EUR) and one *Energies 2020* (13(15), 3788, 11 p., 1718 EUR).

7) to engage private sector's cooperation partners, researchers (from companies) in elaboration of publications. During 2016-2019, within the framework of a study direction there were two such publications per year, while in 2020 there were five publications. In 2020, companies SIA *Ozone Tech*, SIA *HansaMatrix Ventspils* and SIA *RicBerry* cooperated in publications.

8) to introduce all LLU researchers, undergraduate, graduate, postgraduate students to the rules and procedure of intellectual property management and knowledge commercialisation and

knowledge with commercial potential. LLU Technologies and Knowledge Transfer [Department](#) (only in Latvian) actively engages in explaining and promoting such issues. LLU Intellectual Property Management [Policy](#) (only in Latvian) has been elaborated and introduced.

9) to organise cooperation measures between entrepreneurs and scientists (seminars, conferences, contact exchange, training, shared topical discussions on necessary knowledge and technologies, cooperation in creating and introducing them, conditions of use and other measures promoting knowledge transfer). LLU organises international scientific conferences: [Engineering for Rural Development](#), [Research for Rural Development](#), [Bioeconomy and Rural Development](#). International scientific conferences organised by the faculty [Engineering for Rural Development](#) which resulted in a [collection of papers](#) considerably enhanced recognisability and scientific impact in the reporting period. Representatives of industry's scientific institutions, specialists from the Ministry of Agriculture, members of associations, heads of companies and emerging specialists participate in annual scientifically applied conferences "Balanced [Agriculture](#)" (only in Latvian), meanwhile in international student conference "[Students on their Way to Science](#)" students could demonstrate the results of their research.

Previously described tasks have a positive influence on international recognisability, they help recognisability, implementing high level research and attainment of internationally recognised research results. Achievements in context of study direction define full-time equivalent, scientific project funding, increase of indexed international scientific publications in Scopus and Web of Science databases, see Table 2.8 where the planned and attained results in 2020 in TF are shown.

LLU delivers [programme](#) (only in Latvian) *Conducting of Fundamental Research in LLU*, by creating new knowledge and technological insights in research directions stated in LLU Development Strategy. An application for project can be submitted by researchers elected in LLU or leading researchers who have completed, are still working or have received approval on starting industrial (applied) research or experimental elaboration project on the moment of application submission. Total funding of one research project is up to 10,000 euro, implementation period is up to two years.

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.

Majority of academic staff (58%) working in the study direction performs functions of both teaching staff and research staff. Therefore, results of the most relevant and topical research are quickly integrated in the study process. It allows complying with the principle of Latvian Education Development [Framework](#) (only in Latvian) 2014-2020, education fostering a knowledge-based society. In the reporting period, the academic staff of study direction has prepared 10 teaching materials and scientific monographs with results of scientific projects which are used in the study process. For example, within ERAF project No. 2010/0305/2DP/2.1.1.1.0./10/APIA/VIAA/130 a monograph *Research of the exploitational and infrastructural parameters of electric vehicles* [electronic resource] (2013, p. 163) was prepared, within the framework of National research programme LATENERGI project 6.2 a report *Biogas production in Latvia* (2018, p. 152) was written, and also in the beginning of 2020, a long-term and fruitful cooperation with colleagues from the Estonian University of Life Sciences resulted in Estonian language textbook *Karjandustehnika* (Animal Husbandry Machinery) for university students Tartu, 2021. pp. 276.).

Academic staff members, who are teaching mathematics, and programme directors were involved in *Nordplus project* (only in Latvian) *Building an understanding on the role of mathematics in promoting specialist competences in context of sustainable development* (2016-2017) in order to promote better mathematics literacy among students.

Results of ERAF *project* (only in Latvian) *Elaboration of a prototype of electric car charging station management optimisation system* (2020-2021) are used both for undergraduate and graduate studies in ground vehicle and energetics

Students from undergraduate and graduate programmes are involved in implementation and development of the European Agricultural Fund for Rural Development (ELFLA) *project* (only in Latvian) *Autonomous Robotised Platform Latvijas iDārzs – sustainable planting industry development* (2019-2022). The results are presented in different *institutions* (only in Latvian), and in studies. A *project* (only in Latvian) of the same fund (2019-2023) *Research of efficient heat generation and supply solutions in covered areas* is closely related to the field of energetics.

In order to motivate academic staff to prepare teaching materials and integrate them in projects and experience obtained in applied research – into study process in LLU, a motivation system was set up where preparation of teaching materials and scientific dimension are elements under evaluation and subject to additional funding for the academic staff.

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.

Location of LLU and interaction with universities and research institutions around the world and in the Baltic Sea region have promoted recognisability of study direction’s leading researchers and their research at European scale, especially in the Baltic Sea region. It is largely dictated by niche research in study direction related to bioeconomy and agricultural machinery.

Cooperation in research is characterised by joint publications and papers in scientific conferences. The summary is outlined in the table.

SCOPUS indexed publications with co-authors from abroad in the study direction

University, national	2015	2016	2017	2018	2019	2020
Czech University of Life Sciences Prague, Czech Republic	2	3	2	4	3	1
Estonian University of Life Sciences, Estonia	-	2	1	2	-	-
Vytautas Magnus University Agriculture Academy, Kaunas	-	2	2	5	5	4

J. E. Purkyne University in Usti nad Labem, Czech Republic	-	-	-	-	-	1
Warsaw University of Life Sciences, Poland	-	1	2	2	-	1
National University of Life and Environmental Sciences of Ukraine	-	-	-	2	3	3
Kazimierz Pułaski University of Technology and Humanities in Radom, Poland	-	-	-	1	-	1

Cooperation in research, which has developed through scientific [conference](#) Engineering for Rural Development traditionally organised in the faculty, has encouraged student exchange among universities, and students from programmes of virtually all directions have benefited from them. Several visiting lecturers from the mentioned universities have read lectures to the direction's students and several academic staff members from the direction have read lectures in the mentioned partnering universities within the framework of ERASMUS (for a summary refer to the table).

Student and academic staff member exchange in ERASMUS programme

Partnering university	Programme students in ERASMUS	LLU visiting lecturers in partnering universities	Visiting lecturers from partnering universities in LLU
Czech University of Life Sciences Prague, Czech Republic	2015 - 2 2017 - 2 2020 - 2	2015 - 2 2016 - 1 2017 - 2 2018 - 2 2019 - 3	2017 - 3 2018 - 5 2019 - 2
Vytautas Magnus University Agriculture Academy, Kaunas	2016 - 1 2017 - 1 2018 - 2 2019 - 2 2020 - 2	2015 - 2 2016 - 1 2017 - 2 2018 - 2 2019 - 1	2016 - 2 2017 - 5 2018 - 3
J. E. Purkyne University in Usti nad Labem, Czech Republic		2018 - 1	
Kazimierz Pułaski University of Technology and Humanities in Radom, Poland		2016 - 1 2020 - 1	2017 - 1 2018 - 2 2019 - 2

Saint-Petersburg State Agrarian University, Russia		2018 - 2
Belgorod State Agricultural University, Russia		2018 - 1
Alexander Technological Educational Institute of Tessaloniki, Greece	2018 - 2 2019 - 1	
Klaipeda University, Lithuania		2019 - 1
International Hellenic University, Greece	2020 - 3	
Technical University of Ostrava, Poland	2019 -1	2016 - 1
University of Bari Aldo Moro, Italy		2017 - 3 2018 - 3
Suleyman Demirel University, Turkey		2017 - 2
Technical University-Sofia, Bulgaria		2017 - 2

The academic staff members from direction actively partake and engage in different international organisations: Baltic University of Forestry, Veterinary and Agriculture (BOVA); Nordic Association of Agricultural Scientists (NJF); European Society for Agronomy; International Cold Storage Academy; International Society for Applied Mathematics and Mechanics; editorial board of journal INMATECH-Agricultural Engineering (Romania); editorial board of journal Agronomy Research (Estonia); International Federation of Automated Control; Society for Engineering in Agricultural, Food and Biological Systems; European Biogas Association.

Further international cooperation for scientific development is based on closer integration of science and research in study process; promoting of science and research both internationally and nationally (through www.sciencelatvia.lv); use of internal LLU scholarships to support new scientists and attracting new scientists from abroad; promote publishing of graduate and postgraduate students' research in international periodicals; promote preparation of international project applications by developing more targeted motivation system and performance funding for science

4.4. Specify the way how the higher education institution/ college promotes the involvement of the teaching staff in scientific research and/or artistic creation. Provide the description and assessment of the activities carried out by the academic staff in the field of scientific research and/or artistic creation relevant to the study direction by providing examples and the summary of the quantitative data on the activities in the field of scientific research and/or artistic creation relevant to the study direction over the reporting period, for instance, the publications, participation in conferences, activities in the field of artistic creation, participation in projects by the academic staff members, etc., by listing the aforementioned according to the relevance.

LLU has its LLU Academic staff motivation system approved with Study Council resolution No. 2.4-13/8 of 29.11.2017, where up to 5 points in each section of the motivation system are given for scientific publications and papers in scientific conferences. Information about both sections is stored in LLU Information System and assessment is taken from the user account in the system.

According to the Academic work calculation regulation approved in LLU Senate on 11.03.2020, the academic work is calculated taking into account also supervision and reviewing of Master theses (2 h and 0.4 h per one credit for one student respectively), as well as supervision of doctoral thesis (60 h per year for a full-time doctoral student and 45 h per year for part-time doctoral student).

Resolution No. 4.3-8/17 of LLU Rector of 10.03.2017 determines that one of four sections of academic staff member's work volume is scientific work. Different amount of work in classrooms is intended for different categories of academic staff positions, aimed at devoting larger portion of scientifically qualified academic staff members' work to research, accordingly reducing the proportion of mandatory classroom work in total volume of work. The minimum amount of classroom work for an assistant per year is 512-640 h, for a professor it is 192-256 h.

LLU has its Procedure for evaluating scientific work efficiency of LLU academic staff members approved with LLU Science Council of 29.04.2020. Efficiency of the scientific activity is evaluated in 7 sections: scientific and contracted projects (5 criteria); scientific and scientific popular publications (5); patents (3); supervision of master and doctoral theses (3); participation in conferences and exhibitions (4); reviewing of scientific papers and work in editorial boards (4); organisational work for ensuring the scientific activity (2). LLU academic staff submits a summary of scientific activity (electronically) for previous year until January 11 of each year. When summing up the individual assessments of the academic staff, it results in evaluation of scientific activity efficiency of structural units.

LLU has a system regulating utilisation of base funding, by dividing certain part of it for structural units depending on the results attained. Each researcher receives performance funding, size of which directly depends on the results of scientific endeavours. In order to improve the scientific capacity of LLU and promote engagement of graduate, postgraduate students and new scientists in the scientific activity, a programme Implementation of LLU Research Programmes was created where projects are funded on a competition basis. Research projects in priority research directions defined in LLU science development strategy are supported within the framework of the programme. Programme's project submission can be submitted by the researchers or leading researchers elected in LLU. Every person can apply only one project for a competition per application round. Application acceptance competition is announced in spring - information is placed on LLU portal and news page.

LLU has also a programme Conducting of Fundamental Research in LLU. The goal of the programme is to make sure fundamental research is conducted in LLU thus creating new knowledge and technological insights in research directions stated in LLU Development Strategy. The fundamental research is experimental or theoretical, conducted mainly to acquire new knowledge on things and phenomena without a special commercial application or use in mind. Research projects in priority research directions defined in LLU science development strategy to be supported within the framework of the programme. An application for programme's project can be submitted by researchers elected in LLU or leading researchers who have completed, are working on or have received approval on starting industrial (applied) research or experimental elaboration project on the moment of application submission. Every person can apply only one project for a competition per application round. Total funding of one research project is up to 10,000 euro, implementation

period is up to two years.

Results of scientific research in the study direction

<i>Publications, papers, projects</i>	<i>Number in a study year</i>				
	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020
International, reviewed, scientific publications which are included in Web of Science or Scopus scientific literature databases	54	50	79	53	55
Publications in anonymously quoted international scientific periodicals, incl. proceedings	13	17	8	27	2
International conference materials (Abstract)	29	7	29	26	10
A list of papers from international scientific conferences	51	46	57	84	53
Scientifically popular and scientifically methodological publications	11	50	14	11	7
Number of internationally approved or maintained patents, licenses and know-how	8	12	18	18	17
Scientific projects	17	7	6	9	9
incl. projects with student engagement	3	3	2	4	4

The academic staff of the study direction is involved in different scientific projects, such as Innovative solutions to increase the efficiency of combustion motor gas exchange system (LLU project, 2018-2020); Event-based computer vision of agricultural robots (LZP, 2018-2021); Autonomous robotised platform Latvijas iDārzs - for sustainable development of plant nursing (European Agricultural Fund for Agricultural Development - project, 2019-2022)

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

LLU has a programme Strengthening of the scientific capacity in LLU, goal of which is to promote development of priority research directions defined in LLU Science Development Strategy and elaboration of relevant doctoral theses. Research projects in priority research directions defined in LLU science development strategy are supported within the framework of the programme. The expected result is a specific, fixed result which can be used in international scientific circles and innovations - partially prepared section of doctoral theses' results, submitted and approved at least one publication in Scopus or Web of Science indexed journal, including in LLU journal Rural Sustainable Research or in a collection of papers.

An international scientific student conference Students on Their Way to Science has been organised in LLU for 16 years already encouraging student involvement and where students from the study direction participate on a regular basis. [Theses](#) from the conference papers are published each year. 8 students from the direction participated in this conference in 2020. Some of topics: *Tribological properties of feeding unit for packingmachine clinipack*; *Alternative energy sources for lighting*; Analysis of operating parameters for electric scooters etc.

An international scientific [conference](#) of doctoral students, Research for Rural Development, was established in LLU 27 years ago. In a conference of 2019 two doctoral students from the study direction participated with their papers and publications: *Biasing a staged fuel injection system of a single cylinder four stroke gasoline engine* and *Review of cooling solutions for compact electronic devices*. Two papers and articles of doctoral students were published in conference of 2018: *Computational fluid dynamics pressure wave and flow rate analysis of intake runner design in internal combustion engine* and *Increasing cyclone efficiency by using a separator plate*.

Scientific [conference](#) (only inLatvian) of students and graduate students have taken place in the Faculty of Engineering on a regular basis since 2010. 11 graduate students from the study direction presented their papers and [articles](#) (only in Latvian) in the conference of 2020.

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

Universities and theses are intrinsically linked to innovation, because innovation is a process whereby ideas, groundwork and technologies in the new scientific, technical, social, cultural or other areas are implemented as competitive product or service demanded in the market. Students form a part of the society who will be the main driving force behind innovations in their professional activity. To make this process as successful as possible, the emerging innovators, especially in field of engineering, it is very important to learn the fundamental regularities of engineering sciences and to truly understand them and also learn the basics of innovation and technology development and progress.

Entire process of studies is all-embracing motivation for a young person. The very study process is as innovative as possible, and it is directed towards intentional forming and creating of innovations through including innovations in the study process. Product and process innovations prevail in the field of engineering, but, of course, one cannot do without innovations in marketing and organisation.

Every educational institution and teacher are interested in attaining the best result possible. Also, within the framework of study direction, the faculty and relevant structural units and academic staff try to promote study process through innovations in the very study process towards understanding the innovations and skills of creating them both while studying and in creative work life later.

There are some examples which can be presented regarding the innovations in study process, introduction of which is an on-going process. Several years ago, a vehicle test [bench](#) was created and it was possible to test vehicles (mainly cars) in certain modes according to certain programmes elaborated for certain road conditions. It was already an innovation of study process where a vehicle was tested on a test bench in a stationary test instead of real traffic conditions. The bench

was manufactured in USA, also test programmes were created for conditions characteristic for U.S. Faculty's academic staff reviewed the programme, principles of formation and created several test programmes for the bench matching the routes in Jelgava city and road in its vicinity. As a result, students spend considerably less inefficient time in experiments, the very road test is much safer, demo experiments can be repeated for unlimited times and regardless of weather. The first innovation in study process was buying of a roll bench with standard test programme, the second one - upgrading of the bench by academic staff members, adapting it to appropriate Latvian road programmes.

During the study process dozens of lab demo test benches were created by the academic staff members and technical staff thus enriching the study process and allowing students to acquire study materials much better or comprehensively. In 2018, SIA [ARMGATE](#) (only in Latvian) donated 14 different test benches to learn about vehicle construction, operation and adjusting. This set considerably improves and enriches learning about vehicles.

Students learn about innovations in all study programmes and during study and professional traineeships. Students engage in creation of innovations most distinctively when elaborating their theses. Topics of theses, titles of which already indicate a movement towards innovation, can be presented as examples: *Neste My Renewable Diesel Fuel Operating Parameters Research*; *Design of Strawberry Planting Machine*; *Solutions of One Megawatt Solar Power Station Development in Latvia (Mg)*; *Development and Research of a Solar Powered Electric Bicycle (Mg)*; *Bee Collar Stretching Machine Project*; *Modernisation of a Dairy Cow Farm "Druvas"*.

Academic staff members of the study direction and individual LLU structural units implement a number of activities which promote introduction of different forms of innovations. For example, innovations in technologies and cooperation are delivered in LLU Department of Technologies and Knowledge Transfer, task of which is to promote a cooperation among scientists, students and entrepreneurs, develop innovative technological solutions and products with higher added value, rooted in scientific research and interdisciplinary cooperation of scientists and students. Networking and innovation events, idea development and approbation processes and seminars and work group events related to intellectual property defence take place in the Department of Technologies and Knowledge Transfer. One of priorities of the Department of Technology and Knowledge Transfer is to create and strengthen interdisciplinary student contacts, by developing innovative solutions in fields of study and science represented in LLU.

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

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

Cooperation of the study direction with Latvian institutions take place in several ways:

- cooperation with Latvian Employers Confederation (LDDK) – director of study direction is a member of Metal Processing, Machine Building and Machine Science Industry Experts Council (only in Latvian) (MMM NEP) in LDDK. Two professors from the study direction are included in MMM NEP work group to prepare profession standard for Motor Vehicle Engineer in a work group together with colleagues from RTU;
- head of the study direction is also the head of Motor Vehicle Qualification Commission both in Riga Technical College and Malnava College since 2010;
- in 2019, an agreement (only in Latvian) was signed with Malnava College on closer cooperation in future;
- in 2018, a cooperation agreement was signed with Jelgava Vocational School, (only in Latvian) which also prepares motor transport specialists;
- professors from the study direction are included in LLU Council of Environmental Engineering and Energetics Professors (6) and RTU councils of professors: Electrical engineering and electronics, Machine building and mechanics, Transport Engineering Science;
- professor from the study direction is a member of Expert Commission of Engineering Sciences and Technologies under Latvian Science Council;
- seven professors from the study direction are members of Doctoral Council in LLU Environmental Engineering and Energetics Sector;
- members of LLU Counsellor Convent (only in Latvian) are three alumni who graduated from the study direction; there is a close collaboration between them and companies and businesses run by them and the faculty;
- a member of LLU Consultative Council of International Experts is Engineering Faculty's dean of faculty's cooperation partner – Czech University of Life Sciences Prague. Study direction has a long-lasting and productive bilateral cooperation with this faculty in teaching, research and administrative area;
- Productive long-term cooperation with related faculties in Estonian University of Life Sciences, Tartu, and Vytautas Magnus University Agriculture Academy, Kaunas.
- the final examination commissions of study direction programmes include: Director of National Technical Supervision Agency, Chairman of the Association of Machine Building and Metal Processing Industry; board member of LLC Jelgavas Autobusu parks; board chairman of JSC Auto-Remonts; board member of LLC Auto Starts tūre; board member and expert of LLC JMV ekspertu grupa; head of CSDD Technical Department; head of heat supply service of LLC Fortum Jelgava; electrical devices operation engineer of JSC Sadales tīkls; board member of LLC ESP; technologist of LLC EAST METAL; board member of LLC TRIMET; head of Ulbroka Science Centre and his deputy; board chairman of LLC Viesu Līči; board member of Latvian national association of Ground Vehicles Sworn Experts, certified sworn technical expert;
- a professor from the study direction is a board (only in Latvian) member of Latvian Development and Education Association, where members are the major transport companies and education institutions of Latvia. The main line of Association's activity is delivery of transport sector's projects, building of logistics systems at regional scale, introduction of modern navigation and IT solutions in transport monitoring applications and also a support to education institutions in elaboration of education programmes in transport sector.

- long-term professor of the study direction is a **board** (only in Latvian) member of the Latvian Vehicle Engineer Association, and several academic staff members of the study direction participate in the association. The main goal of association's activity is to bring together Latvian vehicle engineers and specialists from the companies related to vehicles, and also industry's companies to promote mutual cooperation and professional development of the industry. Students of the study direction regularly receive awards in student work **competitions** (only in Latvian) organised by LAIA;

- extensive long-term cooperation with JSC Latvenergo, and **academic staff members, and students** (only in Latvian) of the study direction receiving awards in different Latvenergo competitions;

- cooperation with RTU, for example, current cooperation **project** (only in Latvian) with RTU in event-based computerised vision for agricultural robots, students and **graduate students** (only in Latvian) have good success in competitions of student **theses** (only in Latvian) organised by RTU Development Fund;

- contracted research, for example, Research of application efficiency of **energy accumulators and dispersed generation sources in electrical network and electricity supply to customers** (Latvenergo); *Impact of diesel fuel **additive** (only in Latvian) on vehicle operation parameters* (LLC EAST - WEST TRANSIT); Impact of diesel fuel additives on tractor performance (LKPS LATRAPs); **Substantiation** (only in Latvian) of choice of the measures to reduce and mitigate ammonia emission restrictions in agriculture and efficiency assessment (Ministry of Agriculture);

- important role in establishing and developing international cooperation is given to traditional scientific conference organised by the faculty, it allows establishing and exchanging contacts between **academic staff members** (only in Latvian) and their foreign colleagues, and also **students** (only in Latvian) and their peers in partnering universities. In 2020, due to COVID pandemic the conference **took place** (only in Latvian) remotely, and also 20th jubilee conference in 2021 **will take place** remotely;

- an important role is played by participation in different exhibitions where the groundwork is prepared within the framework of the study direction, such as **Tech Industry** (only in Latvian), **Metal Festival** (only in Latvian), **Invention** and Innovation festivals Minox (only in Latvian), **Engineering days** (only in Latvian), Technical **Creativity** Days (only in Latvian).

One of important areas of cooperation with entrepreneurs is student traineeship – both study and professional traineeships. Choice of cooperation partners in this aspect takes place following professional criteria and suitability of traineeship programme's requirements. Each head of traineeship has a list of companies which are modern in technical and organisational terms and they correspond to traineeship requirements and are ready to admit and train apprentices.

The cooperation agreements of the study direction "Mechanics and Metalworking, Heat Power Engineering, Heat Engineering and Mechanical Engineering" of the Faculty of Engineering of the Latvia University of Life Sciences and Technologies are listed in annex 2_part_7. They could be divided into several categories, which directly or indirectly influence the achievement of the aim of the study field and study results. Cooperation with secondary schools should be emphasized in one category. Joint development of study programs, as well as work in examination commissions, promotes the development of coordinated study programs and avoids duplication. The logical step for the smartest young people after graduating from a secondary school or technical school, is to continue their studies at a higher education institution. Cooperation with schools promotes an increase in the number of students at LLU and Faculty of Engineering, which in turn allows to improve the quality of studies. Closer cooperation also takes place with the students themselves, who choose to develop their research projects under the guidance of LLU lecturers. In this process

derives insight LLU operations and infrastructure. It is also worth mentioning special cooperation with Jelgava Secondary School of Technologies, where our lecturers teach specialized study courses with the aim to prepare for further studies.

Next, a category of agreements with cooperation in the field of science and study process implementation could be distinguished. The majority here are various higher education institutions and scientific institutions, but such cooperation also takes place with secondary education institutions and, most importantly, with production companies. Research is an important indicator of the quality of the study process. 80-90% of bachelor's and master's theses developed in the study direction are related to topics important for manufacturing companies. It should be mentioned, however, that a cooperation agreement has not been signed with all these companies, because the legislation of the Latvian state does not impose it as an obligation and it has no practical significance. More important is this mutually successful cooperation. The student has an actual topic, practical advice and the necessary materials from the company and theoretical knowledge, experimental base from the LLU. Emphasis should also be placed on international cooperation, joint research and publications that highlight the relevance of the research topics in Europe and the world. The next step in such international cooperation is the development of a common study program. Understanding the strengths of each university (material and theoretical basis), it is possible to create a study program that will further contribute to the sustainable development of countries and the world.

Cooperation with companies that have been providing internships for our students for a long time. This category of contracts is often closely linked to the previous one. LLU students in these companies both undergo practical training and in the final phase of studies solve topics relevant to the company within the framework of bachelor's and master's theses. Many such companies that are not mentioned in annex 2_part_7 could be listed here, because the Faculty of Engineering also concludes one-time tripartite agreements between LLU, the company and the student, where the terms of mutual cooperation during the internship are stipulated. In most cases, after the internship and completed studies, the student remains to work in this company.

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

LLU informs about the study offer in their [website](#) in English. In order to attract foreign students the International Cooperation Centre employs various marketing activities: agreements are signed with recruitment agents, intending an evaluation of their work efficiency, e-marketing, participation in international education fairs and agent forums etc. LLU is a member of Latvian Association of Higher Education Experts (AIEA) and partakes in the activities organised by it. LLU has signed an [Agreement](#) (only in Latvian) on the best practice to attract foreign students. Foreign traineeships are given funding within the framework of [Erasmus+](#) mobility projects on the basis of individual agreements. The academic Bachelor's study programme Biosystems Machinery and Technologies was launched in 2020, and it focuses on foreign students, it is offered to foreign students both on LLU [website](#) and different marketing, incl. e-marketing events. It was planned to start admission in 2020 but due to COVID pandemic it could not be organised. Foreign students are also offered [postgraduate](#) programme and academic [graduate](#) programme's sub-programme *Vehicles and Service* and *Power Engineering*. Two doctoral students from Lithuania graduated from the postgraduate programme in the reporting period; there are still no foreign students in full-time

graduate programme. A student from Sh. Ualikhanov Kokshetau State University in Kokshetau Kazakhstan studied in the graduate programme Agricultural Engineering in autumn semester 2014.

Foreign academic staff members are attracted to the study direction within the framework of ESF projects, in ERASMUS programme. A professor from Vytautas Magnus University Agriculture Academy delivered a lecture cycle Minimum Soil Treatment Methods and Technology for Agricultural Engineering students in December 2015, within the framework of ERASMUS, and associated professor Algirdas Jasinskas delivered a lecture cycle Unconventional Energy Plant Harvesting and Preparation of Technological-Technical and Energetic Assessment for Biofuel and Determination of Physically Mechanical Properties of Biomass. In 2017, a university lecturer from Czech University of Life Sciences Prague delivered a lecture cycle Water Erosion – Problem of European Agriculture and New trends in Soil Tillage; associated professor delivered a lecture cycle Integrated Farming System and Combined Harvesting-operational Costs Analyses, while a professor from Univerzita Jana Evangelisty Purkyne v Usti nad Labem (Czech Republic) – New Trends of Engineering Education, Lifelong Learning, Teaching on Information. A professor from Saint-Petersburg State Agrarian University, Faculty of Technical Systems, Service and Energetics, delivered a lecture cycle: Technological basis of soil tillage; rational tillage based in balanced land cultivation; main directions of tillage machinery development; rheological model of soil condition; head of Technical Mechanics and Machine Design Department, Engineering Faculty of Belograd National Agrarian University delivered a lecture cycle – Basic principles of agricultural machinery design. Associated professor from Kazimierz Pułaski University of Technology and Humanities in Radom (Poland) delivered a lecture course Ecology Aspects of the European On Board Diagnostic System to the students in 2019; and associated professor from the same university delivered a lecture course Basic Theory of Maintenance and Operation of Complex Technical Systems. Within the framework of ESF project Improvement of LLU Academic Staff, a [professor](#) (only in Latvian) from the Mechanics Faculty of Kazimierz Pułaski University of Technology and Humanities in Radom delivered a lecture cycle Concept of Industry 4 and prepared study materials on this topic.

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

All undergraduate programmes envisage professional traineeships. Traineeship organisation in LLU is governed by [Traineeship Regulation](#) (only in Latvian). Traineeships are organised in suitable industry's companies. Each traineeship is headed by the traineeship supervisor – academic staff member from LLU and traineeship supervisor from the traineeship company among the leading specialists of the company.

Faculty and university in general, through traineeship supervisors and programme directors receive several traineeship offers from long-term cooperation partners on a regular basis, for example, LLC DINEX Latvia, LLC Dojus, LLC Silja, Jelgava printing house, Scania Latvia and many others. Students from the programme underwent traineeship in companies in 2020. *WT TERMINAL; VALTEK; DOJUS Latvija; Dotnuva Baltic; GPower; AMAZONE; Baltic Agro Machinery and many others.* Information about traineeship offers is available to faculty's students on the news board and faculty's [website](#) (only in Latvian). Students are informed about traineeship possibilities by programme directors and traineeship supervisors. Individual cooperation partners organise visiting lectures for students annually, and also field excursions to industry's companies during which the students are informed

about traineeship and work opportunities. Traineeship and workplace offer is always considerably exceeds the number of potential apprentices or employees in all areas of programmes.

Within the framework of ERASMUS+ [programme](#), students can train in foreign companies in one of Erasmus+ programme's member countries both during the studies and one year after graduating the studies. Students mainly search for traineeship places abroad individually. If a traineeship offer was received from LLU foreign cooperation partner, LLU International Cooperation Centre offers to students the traineeship opportunities abroad by sending electronic information to programme directors who inform students about traineeship opportunities.

The traineeship offer is available for students also on LLU website, Work and Traineeship [Offers](#) (only in Latvian) section. Students can use also possibilities of [portal](#) [Prakse.lv](#) (only in Latvian) and participate in competitions for traineeship places. LLU, in cooperation with Development Fund of Riga Technical University offers students a possibility to participate in open competitions and get paid traineeship places in different local and foreign capital companies in Latvia.

Traineeships in study direction are implemented according to Cabinet of Ministers [Regulation](#) No. 512 *Regulation on national standard for second level professional higher education* (only in Latvian), LLU *Study Regulation*, LLU Traineeship [Regulation](#) (only in Latvian), Traineeship [Regulation](#) of Ground Vehicles Institution (only in Latvian).

Traineeships are organised during the semester, and no classes are planned during the traineeship. Traineeship is supervised and coordinated by an academic staff member – traineeship supervisor who is approved by institute director. One week before the beginning of traineeship, the traineeship supervisor submits an application to a person drawing up the dean's order on assigning a student to traineeship.

The student chooses a traineeship place individually to comply with traineeship programme's requirements by coordinating the traineeship place with a traineeship supervisor and entering into the traineeship agreement on providing a traineeship place. Traineeship supervisor evaluates compliance of the traineeship place with the programme.

By assigning students to the traineeship, a dean's order is issued and traineeship [agreement](#) (only in Latvian) signed by LLU, student and traineeship provider. If a student heads for a traineeship abroad, a dean's order and traineeship agreement are prepared in [English](#). International exchange programme, inter-university and other agreements documentation and rector's order of students heading for a traineeship are prepared by LLU International Cooperation Centre.

The traineeship has two supervisors: one from the relevant institute of the faculty who organises traineeship, appointed traineeship supervisor who coordinates and supervises traineeship progress and manages apprentice's work and consults him or her according to the traineeship programme. During the traineeship there are regular consultations with traineeship supervisor from the institute to ensure the tasks of the traineeship are attained.

If a student changes their traineeship provider, and in this case a person in charge in the faculty prepares a new dean's order on the changes in previous order on the basis of student's application on change of traineeship. Traineeship supervisor prepares a new traineeship contract.

During the traineeship a student prepares a traineeship report according to the traineeship programme and submits it together with the traineeship report and a recommendation from the traineeship provider to the traineeship supervisor. The traineeship report is defended and evaluated by the institute's commission, which includes also traineeship supervisor

5.4. In the event that joint study programmes are implemented in the study direction, provide the justification of the creation of the joint study programmes and a description and assessment of the selection of the partnering higher education institutions by including information on the principles and the procedures for the creation and implementation of these joint study programmes. In the event that no joint study programmes are implemented in the study direction, provide a description and assessment of the plans of the higher education institution/ college for the creation of such study programmes within the study direction.

No joint study programme is implemented in the study direction.

Currently there are negotiations with Technical Faculty of Czech University of Life Sciences Prague about possible joint study programme in agricultural engineering.

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

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

International evaluation of study direction and programmes included in it was carried out on 10.05.2012 within the framework of ESF project *Evaluation of Higher Education Study Programmes and Suggestions for Quality Improvements* (Agreement No. 2011/0012/1DP/1.1.2.2.1/11/IPIA/VIAA/001). Evaluation commission experts: commission chairman Prof. Ramunas Palsaitis, commission members: Prof. Viktoras Senčila, Dr. Māris Jurušs, Mr. Kalvis Innuss, Mr. Matīss Baumanis (LSA).

Five study programmes were submitted to the Commission for evaluation: first level professional higher education programme Technical Expert, code 41525; academic Bachelor's study programme Agricultural Engineering, code 43525; professional Bachelor's study programme Machine Designing and Production, code 42521; academic Master's study programme Agricultural Engineering, code 45525; doctoral study programme Agricultural Engineering, code 51525.

Joint conclusion of the Expert Commission was: All study programmes of the Latvia University of Life Sciences and Technologies in the direction Mechanics and Metal Works are considered to be sustainable.

During previous accreditation of the study direction, recommendations provided by experts were implemented (see Annex 2_part_1_annex) ensuring both development of study direction and programmes contained in it, consolidation and improvement of study quality. Part of recommendations provided by experts are included as resulting indicators in TF Work Plan for Implementation of LLU Development Strategy 2015-2022, thus providing uninterrupted

improvement

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

One newly created programme - academic Bachelor's study programme Biosystems Machinery and Technologies - was included in accreditation sheet of the study direction in the reporting period. Analysis of recommendations provided by experts is given in Clause 2.6 of section Biosystems Machinery and Technologies

Annexes

I. Information on the Higher Education Institution/ College		
List of the governing regulatory enactments and regulations of the higher education institution/ college	1_part_1_annex_Main_internal_legal_acts_and_regulations.docx	1_dala_1_pielikums_Galveno_normativo_dokumentu_saraksts.docx
Information on the implementation of the study direction in the branches of the higher education institution/ college (if applicable)		
Management structure of the higher education institution/ college	1_part_2_annex_LLU_management_structure_EN.docx	1_dala_2_pielikums_LLU_parvaldibas_shema_LV.docx
II. Description of the Study Direction - 1. Management of the Study Direction		
Plan for the development of the study direction (if applicable)	2_part_1_annex_SD_development_plan.pdf	2_dala_1_pielikums_SV_attistibas_plans.pdf
Management structure of the study direction	2_part_2_annex_SD_management.pdf	2_dala_2_pielikums_SV_parvaldiba.pdf
II. Description of the Study Direction - 3. Resources and Provision of the Study Direction		
Basic information on the teaching staff involved in the implementation of the study direction	2_part_3_annex_Teaching_staff.xlsx	2_dala_3_pielikums_Macibspeki.xlsx
Biographies of the teaching staff members (in Europass Curriculum Vitae format)	2_part_4_annex_CV.zip	2_dala_4_pielikums_CV.zip
Summary of the statistical data on the incoming and outgoing mobility of the teaching staff over the reporting period	2_part_5_annex_teaching_staff_mobility.pdf	2_dala_5_pielikums_macibsp_mobilitate.pdf
II. Description of the Study Direction - 4. Scientific Research and Artistic Creation		
List of the publications, patents, and artistic creations of the teaching staff over the reporting period	2_part_6_annex_publications_patents.xlsx	2_dala_6_pielikums_macibsp_publicācijas_patenti.xlsx
II. Description of the Study Direction - 5. Cooperation and Internationalisation		
List of cooperation agreements	2_part_7_annex_Cooperation_agreements.xlsx	2_dala_7_pielikums_Sadarbibas_ligumi.xlsx
Statistical data on the teaching staff and the students from abroad	2_part_8_annex_Foreign_stud_staff.pdf	2_dala_8_pielikums_Arvalstu_stud_macsp.pdf
Statistical data on the mobility of students (by specifying the study programmes)	2_part_9_annex_Stud_mobility.pdf	2_dala_9_pielikums_Stud_mobilitate.pdf
Description of the organisation of the traineeship of the students	2_part_10_annex_Traineeship_regulation.pdf	2_dala_10_pielikums_Praksu_nolikums_un_ligums.pdf
Information on the agreements and other documents confirming the traineeship of the students in companies	2_part_11_annex_Practice_provision.pdf	2_dala_11_pielikums_Prakses_nodrosinajums.pdf
II. Description of the Study Direction - 6. Implementation of the Recommendations Received During the Previous Assessment Procedures		
Overview of the implementation of the provided recommendations	2_part_12_annex_Recommendations.pdf	2_dala_12_pielikums_Rekomendāciju_izpilde.pdf
Description of the Study Programme - Other mandatory attachments		
Confirmation signed by the rector, director or the head of the study programme or the study direction of the higher education institution/ college which states that the official language proficiency of the teaching staff involved in the implementation of the relevant study programmes of the study direction complies with the regulations on the level of the official language knowledge and the procedures for testing official language proficiency for performing professional duties and office duties.	LLU_Confirmation_Mehanika_EN.docx	LLU_apliecinajums_Mehānikas_virzīnam.edoc
III. Description of the Study Programme - 1. Indicators Describing the Study Programme		
Compliance of the joint study programme with the provisions of the Law on Institutions of Higher Education (table)		
Statistics on the students over the reporting period		
III. Description of the Study Programme - 2. The Content of Studies and Implementation Thereof		
Compliance of the study programme with the State Education Standard		
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard (if applicable)		Atbilstiba_profes_standartam.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	MG_5_pielikums_Studejoso_statistika.pdf	
Curriculum of the study programme (for each type and form of the implementation of the study programme)		
Descriptions of the study courses/ modules		
Description of the Study Direction - Other mandatory attachments		
Sample of the diploma to be issued for the acquisition of the study programme.		
Description of the Study Programme - Other mandatory attachments		
Document confirming that the higher education institution/ college will provide the students with the options to continue the acquisition of education in another study programme or at another higher education institution/ college (a contract with another accredited higher education institution/ college), in case the implementation of the study programme is discontinued		
Document confirming that the higher education institution/ college guarantees to the students a compensation for losses if the study programme is not accredited or the licence of the study programme is revoked due to the actions of the higher education institution/ college (actions or failure to act) and the student does not wish to continue the studies in another study programme		
Confirmation of the higher education institution/ college that the teaching staff members to be involved in the implementation of the study programme have at least B2-level knowledge of a related foreign language according to European language levels (see the levels under www.europass.lv), if the study programme or any part thereof is to be implemented in a foreign language.		

<p>If the study programmes in the study direction subject to the assessment are doctoral study programmes, a confirmation that at least five teaching staff members with doctoral degree are among the academic staff of a doctoral study programme, at least three of which are experts approved by the Latvian Science Council in the respective field or sub-field of science, in which the study programme has intended to award a scientific degree.</p>		
<p>If academic study programmes are implemented within the study direction, a document confirming that the academic staff of the academic study programme complies with the provisions set out in Section 55, Paragraph one, Clause three of the Law on Institutions of Higher Education</p>		
<p>Sample (or samples) of the study agreement</p>		
<p>If academic study programmes for less than 250 full-time students are implemented within the study direction, the opinion of the Council for Higher Education shall be attached in compliance with Section 55, Paragraph two of the Law on Institutions of Higher Education.</p>		
<p>Description of the Study Direction - Other mandatory attachments</p>		
<p>Electronically signed application form for assessment of a study direction</p>	<p>iesniegums_studiju_virzienam_Mehnika_novertesana_EN_change.docx</p>	<p>iesniegums_studiju_virzienam_Mehnika_novertesana_precizets.edoc</p>

Other annexes

Name of document	Document
LLU galvenie dokumenti latviešu valodā	Dokumenti latviešu valodā-20210531.zip
Pielikums II-3.1-1	Materialtehniskais_nodrosinajums_studiju_virzienam.pdf
Annex II-3.1-1	Material_technical_provision_of_the_study_direction.pdf
LLU Documents in English	Documents in English-20210603.zip
Mācībspēku dalība projektos	Macibspeku_daliba_projektos.pdf
Participation of the teaching staff in projects	Participation_teaching_staff_projects.pdf
Pašnovērtējuma ziņojuma precizējumu skaidrojumi	Precizejumi_zinojumam.pdf
MP_9_annex_Study_program_plan_corrected.pdf	MP_9_annex_Study_program_plan_corrected.pdf
MP_6_pielikums_Atbildiba_valsts_izglit_standartam_labots.pdf	MP_6_pielikums_Atbildiba_valsts_izglit_standartam_labots.pdf
MP_6_annex_Compliance_with_the_state_education_standard_corrected.pdf	MP_6_annex_Compliance_with_the_state_education_standard_corrected.pdf
MP_9_pielikums_Studiju_programmas_plans_labots.pdf	MP_9_pielikums_Studiju_programmas_plans_labots.pdf
Mechanical_engineer_standard-ENG.pdf	Mechanical_engineer_standard-ENG.pdf
Mehānikas inženiera standarts-LV (1).pdf	Mehānikas_inženiera_standarts-LV (1).pdf
MP_7_annex_Compliance_with_the_professional_standard_corrected.pdf	MP_7_annex_Compliance_with_the_professional_standard_corrected.pdf
MP_7_pielikums_Atbildiba_profesijas_standartam_labots.pdf	MP_7_pielikums_Atbildiba_profesijas_standartam_labots.pdf

Agricultural Engineering (45525)

Study field	<i>Mechanics and Metal Processing, Heat Power Engineering, Heat Technology, and Mechanical Engineering</i>
ProcedureStudyProgram.Name	<i>Agricultural Engineering</i>
Education classification code	<i>45525</i>
Type of the study programme	<i>Academic master study programme</i>
Name of the study programme director	<i>Dainis</i>
Surname of the study programme director	<i>Berjoza</i>
E-mail of the study programme director	<i>dainis.berjoza@llu.lv</i>
Title of the study programme director	<i>Profesors, Dr.sc.ing.</i>
Phone of the study programme director	<i>29735949</i>
Goal of the study programme	<i>The aim of the studies is to prepare comprehensively educated young scientists, pedagogues, entrepreneurs, public administration and local government specialists who would be able to continue their doctoral studies, decide independently, think creatively and promote the further development of Latvian engineering sciences.</i>

<p>Tasks of the study programme</p>	<p><i>The main task of master's academic studies is to provide an opportunity for master's students to acquire in-depth theoretical knowledge in the chosen field of engineering, as well as to acquire skills of pedagogical and scientific research work.</i></p> <p><i>Subtasks:</i></p> <ol style="list-style-type: none"> <i>1. to understand and master the causal relations of nature and society development in general education disciplines;</i> <i>2. in-depth study of the principles of construction and operation of machines, mechanisms and energy devices, their design and solution of work process technology and related engineering tasks in the fundamental disciplines of engineering sciences;</i> <i>3. in the special disciplines that form the basis of the sub-programs:</i> <ul style="list-style-type: none"> <i>- in the sub-program Agricultural Technologies and Machinery - in-depth study of agricultural technological processes, modern mechanized technologies, machinery used for their implementation, principles of machinery development and design, rational use and maintenance of machinery, renewal of machinery and technological equipment;</i> <i>- in the sub-program Power and Service - in-depth study of the used equipment and technologies, their suitability assessment and rational use possibilities, methodology for solving related technical and organizational tasks in both freight and passenger transport, operation of service companies, sale of cars and their spare parts, transport organization and management, implementation and acquisition of the latest technologies of agricultural enterprises;</i> <i>- in the sub-program Machine Design and Production to acquire the latest mechanical engineering technology, computer design possibilities of various mechanisms, assemblies and units, to master in-depth quality management in various companies;</i> <i>- in-depth study and understanding of the nature and possibilities of the use of alternative energy, as well as various technological solutions, various modern energy resources and energy carriers, as well as the certification process of electrical communication systems and electrical equipment in accordance with EU requirements.</i>
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Results of the study programme	<p><i>Knowledge - extensive, in-depth theoretical and practical knowledge and understanding of research in the relevant field of science, the latest research technologies and equipment, their application, processing of research results and demonstration opportunities.</i></p> <p><i>Skills - the ability to use the acquired knowledge in the development of a master's thesis: analytical analysis of the situation, evaluation and development of research methodology, creation of new knowledge based on the performed research, summarizing, evaluating and interpreting the results. Ability to defend and scientifically substantiate their decisions in solving engineering problems.</i></p> <p><i>Competence - is able to work independently with engineering calculations and analysis of various complexity and scope, to perform experimental and analytical research in relation to the chosen topic.</i></p>
Final examination upon the completion of the study programme	<i>Master thesis.</i>

Study programme forms

Full time studies - 2 years - latvian

Study type and form	<i>Full time studies</i>
Duration in full years	<i>2</i>
Duration in month	<i>0</i>
Language	<i>latvian</i>
Amount (CP)	<i>80</i>
Admission requirements (in English)	<i>Bachelor's degree or second level professional higher education in the field of engineering. If the education was obtained in another field of study, additional admission requirements must be met</i>
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	<i>Master Degree of Mechanical Engineering</i>
Qualification to be obtained (in english)	<i>-</i>

Places of implementation

Place name	City	Address
Latvia University of Life Sciences and Technologies	JELGAVA	LIELĀ IEĻA 2, JELGAVA, LV-3001

Full time studies - 2 years - english

Study type and form	<i>Full time studies</i>
Duration in full years	<i>2</i>
Duration in month	<i>0</i>
Language	<i>english</i>
Amount (CP)	<i>80</i>
Admission requirements (in English)	<i>Bachelor's degree or second level professional higher education in the field of engineering. If the education was obtained in another field of study, additional admission requirements must be met. At least B2 level of English language skills</i>

Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	<i>Master Degree of Mechanical Engineering</i>
Qualification to be obtained (in english)	-

Places of implementation

Place name	City	Address
Latvia University of Life Sciences and Technologies	JELGAVA	LIELĀ IEĻA 2, JELGAVA, LV-3001

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

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

Two sub-programmes “Energetics” and “Vehicles and Service” were offered as full-time studies for foreign students within the framework of Master’s study programme in 2015. No students applied for the studies in these sub-programmes until the end of accreditation period, therefore the programme has not been delivered in English. The study programme did not have part time students in the reporting period since previous accreditation, therefore part-time studies are not planned in future.

1.2. Analysis and assessment of the statistical data on the students of the respective study programme, the dynamics of the number of the students, and the factors affecting the changes to the number of the students. The analysis shall be broken down in the different study forms, types, and languages.

The studies were implemented both as full-time and part-time in previous reporting period. Due to decreasing demand for part-time studies this study form is not offered in current reporting period. Studies take place two days a week, on Thursdays and Fridays. This curriculum is offered because more than 70% of students are working.

Number of students have changed considerably in the Agricultural Engineering Master’s study programme (see annex MG_5). Number of students changes both due to general demographic situation and other trends in the country, for example, the youth starts working and can study only in their leisure time.

Master’s study programme Agricultural Engineering so far have been delivered only in Latvian. Sub-programmes “Energetics” and “Vehicles and Service” have been offered also in English for 6 years, but the foreign students have not shown interest in studying or in some cases they did not have a possibility to get documents necessary for studies.

When analysing the total number of students in the programme, it has decreased by 39% when comparing start and end phase of the reporting period. This considerable reduction is related also to decreased number of alumni in the Bachelor studies. Despite the offered budget places, the alumni of the Bachelor studies often choose career over studies in the Master programme. Learning outcomes and student dropout are very closely linked to finding time for studies in between their working hours. Students often must leave studies because their employers are strict about the working hours. Nevertheless, in this regard one can see positive trends, too. For example, two students left their work in 2016 because they joined Erasmus programme and went to study in the University of Life Sciences in Prague. After returning from Erasmus programme and successfully graduating from the programme, the masters got very good job offers with high salary and they are

currently working in their professional field.

The main reasons why expelled students discontinue studies are: difficulty in balancing work in manufacturing company with studies, and difficulties in completing the study tasks and home assignments.

Changes in dynamics of students admitted mostly correlate to general demographics in the country which sees a steep decrease in the age group of 20-24 (drop by 9% in 2016). At the outset, practically all budget places in the 1st study year were filled, whereas at the end of the reporting period all budget places were not filled due to decreasing number of persons graduating from the Bachelor studies. Comparing the number of students in the beginning and end of the reporting period, it has decreased by 35-40%. It is also difficult to attract students from other universities (alumni of Bachelor studies from other universities), because often they are more interested in certain study courses in Erasmus programme rather than full-time studies.

Studies are most frequently discontinued “at own discretion” and “due to failure to fulfil contractual obligations regarding study requirements”. This trend is more characteristic in the first study year when the students realize inability to balance career with studies.

Main reasons for expelling from studies:

- failure to fulfil contractual obligations regarding the study requirements (most prominent trends in 2015-2018, 1st study year);
- failure to start studies (most prominent in 2013-2016, 1st study year);
- at own discretion (largest proportion in the 1st year, 2013-2016).

Changes in dynamics of the number of students correlate to changes in overall number of students and dropout trends. When analysing the number of students, in the final part of the study period it decreased by 42% when compared to the initial number of students when more students were admitted.

Number of students discontinuing the studies varies between 17 - 41% in the reporting period. Percentage of students who discontinued the studies tend to increase during the last years of given period. At the end of reporting period the budget places were filled only by 65-75% on average.

Performing the analysis by study sub-programs within the reporting period, more students have chosen the study sub-programs “Machine Design and Manufacturing” and “Energetic”.

During the reporting period within the sub-program “Machine Design and Manufacturing” 26.4% of the total number of students studied in the 1st year, but 23.9% of the total number of students in the 2nd year. In the study program “Energetic” 37.2% of master students have studied in the 1st year, but in the 2nd year 37.1% of master students. On average, 19.7% in the 1st year and 15.7% in the 2nd year studied in the sub-program of “Agricultural technologies and techniques”. On average, 16.7% of 1st year students and 22.6% of 2nd year master students have studied in the “Vehicle and Service” sub-program. The different trend for students by courses shows that the drop-out trend for students is different by sub-programs.

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

The Master's study programme Agricultural Engineering complies with the Cabinet [Regulation](#) (only in Latvian) No. 240 of 13 May 2014 "Regulation on the national standard for academic education". All the requirements stipulated in that standard are met.

The Accreditation Commission reviewed the Master's study programme "Agricultural Engineering" on 19 June 2002 and accredited it until 31 December 2008 (Resolution No. 560, accreditation sheet No. 026-511). The Master's study programme was re-accredited in November 2008. The Accreditation Commission accredited the programme on 19 November 2008 for six years - until 31 December 2014 (accreditation sheet No. 026-1581). Study direction was accredited for another 6 years in July 2013.

Title of the programme is Academic Master's study programme "Agricultural Engineering" and it is closely related to Bachelor's study programmes. Study programmes to be mastered at the Bachelor level are "Agricultural Engineering" with sub-programmes "Autotransport" and "Agricultural Machinery", professional Bachelor's study programme "Machine Designing and Manufacturing" and "Applied Energetics". In relation to Bachelor's study programme, the academic Master's study programme "Agricultural Engineering" is divided into four sub-programmes "Vehicles and Service", "Agricultural Technologies and techniques", "Energetics" and "Machine Designing and Manufacturing". When graduating from the Master's study programme, students get Master Degree in Engineering, which is closely linked to the title of the study programme and proposed goals.

Scope and structural distribution of the programme corresponds to the national education standard. For compliance of the programme's volume and structure with the national standard refer to Annex 6.

Title of the programme consists of two words unmistakably reflecting the essence of the study field. Coherence of programme's title and field is accurate and obvious. Admission criteria are related to the necessary knowledge and skills as well as qualification for starting the studies in Master of Engineering study programme.

Admission conditions ensure comprehensible information about the qualification, knowledge, skills and competences acquired in the study programme. Admission conditions clearly define what documents and previous education is required to start the studies ([website](#)). Information is available also on LLU [website](#).

The main task of the study program is to provide an opportunity for master students to acquire in-depth theoretical and practical knowledge in the chosen field of engineering, as well as to acquire pedagogical and scientific research work skills. Four sub-tasks are subordinated to the main task, which are defined for each study sub-program separately. The main task and subtasks of the studies are closely related and subordinated to the aim of the study program. The results of the study program, which include the knowledge, skills and competencies defined by the academic master's study program, are strictly subordinated to the aim of the study program, observing the requirements included in the relevant regulatory documents.

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

2.1. Assessment of the relevance of the content of the study course/ module and the compliance with the needs of the relevant industry and labour market and with the trends

in science. Provide information on how and whether the content of the study course/module is updated in line with the development trends of the relevant industry, labour market, and science. In case of master's and doctoral study programmes, specify and provide the justification as to whether the degrees are awarded in view of the developments and findings in the field of science or artistic creation.

Content of the programme completely meets the needs of the industry and labour market. It is supported by the programme evaluation conducted by industry experts in 2019, within the framework of ESF [project](#) (Only in Latvian). All the study courses were recognised as suitable for industry needs, and recommendations suggested introducing some new courses dealing with environmentally friendly technologies, and introduction of precision agriculture and precision vehicle management in the study process. Following the evaluation, a programme modernisation plan was elaborated and it would be implemented soon.

Each university lecturer updates their course content in line with the introduction of newest technologies, at least once in 2-3 years on average, but in some courses like Agricultural Engineering and Environment, the statistical data are updated annually. Content of the programme is reviewed and optimised, basing on student feedback, recommendations from the Study Centre taking into account also development of modern technologies in the field of engineering.

Academic degree in agricultural engineering is conferred based on the knowledge, skills and competence of master students acquired during the studies and also on the basis of ability to demonstrate their skills in the Master's thesis and scientific research.

Opinion of experts from the employer circles about the content of study programme:

- sub-programmes of the study direction are actually relevant for the industry;
- in general, programme content (curriculum) covers all the necessary knowledge to allow student successfully developing their knowledge and competences at the Bachelor's level;
- study programme's direction in courses focusing on research and practice is evaluated positively.

No significant shortcomings are identified for the study programme. Changes in programme's content and sub-programme's structure have been made and introduced starting from the academic year of 2019/20. The changes have led to merging of study programmes "Field Cultivation Techniques" and "Mechanisation of Livestock Husbandry". Study programmes "Autotransport" and "Technical and Technological Service" were merged in 2018, overlapping with the reporting period, resulting in a new study sub-programme "Vehicles and Service". They were merged because of the low number of students in the sub-programmes and complicated study administration (see annex MG_9).

In order to find out what programme content improvements would suit students, surveys are conducted. 88% of students on average believe that programme content completely meets the requirements in the reporting period.

Study plans and course programmes are reviewed regularly in the Methodological Commission sittings of the Faculty of Engineering and approved in the Council of Faculty of Engineering where necessary. All courses were updated in academic year of 2019/2020 when the course knowledge, skills, competences and evaluation methods were updated.

Academic staff members involved in the programme participate in different scientific conferences and LLU Methodological Conference every year where they analyse various issues related to study

process. Academic staff members read their papers, share experience about latest scientific trends, and this body of knowledge is later integrated into courses delivered by them.

Improvement of course content is based on:

- experience of university lecturers engaged in projects of different scale;
- participation of academic staff in various exchange programmes, for example Erasmus;
- active participation of university lecturers in different associations, professional organisations, consulting councils and expert councils.
- scientific activities of university lecturers, integration of latest scientific findings in study courses;
- insights obtained from the scientific conferences;
- qualification upgrade of university lecturers in seminars.

In the context of the labor market, the Master's study program in Agricultural Engineering is aimed at training qualified specialists and conducting scientific research in the field of engineering, covering a wide range of professional knowledge. In the process of developing a master's thesis, research topics are relevant to the field of science.

This is confirmed by the submission of master's theses to competitions of various professional associations. An example is the highly regarded master's thesis on modelling the airflow in the supply system depending on the design of the throttle valve. The thesis was submitted to the Latvian Association of Automotive Engineers in the competition of students' scientific papers and got the best grade. As part of the thesis, a patent for a new throttle design was also registered.

The research carried out in the master's theses, as well as in various scientific projects is successfully presented both in the students' annual scientific conferences "[Scientific conference of students of Faculty of Engineering](#)" (Only in Luvian) and in the international conference "Students on their Way to Science" in the engineering section. In cooperation with the supervisors of master's theses, students present their research in the international scientific conference "[Engineering for Rural Development](#)", organized by the Faculty of Engineering (TF). A separate examination commission for master's theses is organized for each master's study sub-program, in which highly qualified labor market professionals participate. During the defense of the master theses, the commission also analyzes the compliance of the theses with the latest trends in engineering sciences and the possibilities of practical use in the field of engineering.

2.2. Assessment of the interrelation between the information included in the study courses/ modules, the intended learning outcomes, the set aims and other indicators, the relation between the aims of the study course/ module and the aims and intended outcomes of the study programme. In case of a doctoral study programme, provide a description of the main research roadmaps and the impact of the study programme on research and other education levels.

The study courses of the Master's study program are subordinated to the aim of the Master's program, because the aim, results and content of each study course provide students with academic knowledge, relevant skills, and competence in the chosen field of specialization.

Program's goal, content, and results to be achieved are related to goals and results defined for the courses.

Within the framework of the study programme, when elaborating the courses, requirements of the national academic education standard were met and expert opinions about programme content and study courses in that programme were taken into account. Information included in the courses is closely related to achievement of programme's goal.

Programme's course content influences and ensures preparation of knowledgeable and qualified engineering specialists who can organise and manage engineering companies, their structural units, contribute to qualification upgrade of the new specialists. Course content allows attaining the study outcomes specified in the programme (see annex MG_10).

Research directions of the Master's studies usually are related to topicalities in the industry and also experience and interests of the MA (master) student.

The study courses included in the study program are divided into several blocks. The main ones are the Compulsory study courses (common to all sub-programs) in the amount of 32 CP (credit points) and Specialization study courses in the amount of 21 CP, which are different for each sub-program. The guidelines marked in the knowledge, skills and competencies of the study program are implemented in the compulsory study courses as "Modeling of System Dynamics", "Engineering Research", "Computer-aided Measuring Systems", "Computer Aided Design" and "Study of Patenting".

Specialization study courses of specific sub-programs, for example, "Design of Technology", "Specialized Technology", "Quality Assurance Systems", "Testing and Calculation of Vehicle", "Traffic Control and Modeling", "Projecting in 3D CAM System", "Machine Design", "Theory of Agricultural Machinery and Motor Vehicles", "Automatic Systems Simulation", "Conformity and Certification of Electrical Equipment" "Energy Economics in Agriculture" provides targeted use of knowledge and skills from the compulsory part, ensures the achievement of the aim of the program and acquisition of competencies. 25 CP of Master's thesis compiles the use of knowledge, skills and competencies acquired during the entire study sub-program within the development of the chosen topic.

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

Study methods implemented in the Master's study programme are modern and correspond to the requirements of programme delivery. Studies are delivered as follows:

- class lessons which include contact lessons, practical work, laboratory work, tests, experimental trials;
- outside LLU MA students can participate in conferences, work and practice areas, partake in introduction of latest technologies in companies;
- independent learning: preparation for seminars, conferences, home assignments and tests;
- the creative work includes elaboration and testing of research models and prototypes.

Study courses are predominantly delivered with traditional methods – lectures, laboratory works and practical works.

Reading of lectures are supported by modern computer technologies, multimedia projectors, video materials, handouts. A possibility to read lectures remotely via various computer-aided tools, such as BigBlueButon or Edumeet was introduced last year. To the extent possible, students can listen to lectures on-site and through remote tools.

Practical classes offer active forms of learning which promote analytical and creative mind-set, develop communication skills. Practical works involve works of varied level and complexity.

Students perform tasks work in modern laboratories and also conduct experiments with numerous models and prototypes in field experiments and road tests. Experiments allow gathering experimental data on different digital recorder devices, and data are processed, analysed after the experiment and conclusions drawn.

Students can get methodological materials and [digital](#) course handouts for **independent work**. Lecture materials and primary data on current research and practical and laboratory assignments are placed in the digital system. Once the students complete their assignments, they can upload them in relevant section of e-study system and also communicate with academic staff in case of questions.

Independent work is the main form of work for elaboration of the Master's thesis, on which students work gradually each semester. MA students prepare one paper for conference and read it in the "Scientific [conference](#) of students and MA students" (only in Latvian) during their studies.

Complex use of these methods promote delivery of student-centred education principles and also help achieving learning outcomes and programme's goals.

Study programme envisages traineeship "Research in Agricultural Engineering" where MA students conduct their research linked to their topic of the Master's thesis.

Academic staff members from the Faculty of Engineering have prepared several textbooks, books, other study materials and practical work assignments for the course. Students can read them in e-studies, which corresponds to relevant course.

Video laboratory works elaborated by the teachers are offered for distant learning in several courses. These laboratory works can be used if the student cannot participate in a particular laboratory work and must learn remotely. Tests are prepared in several courses in e-studies.

MA students can find the methodological materials for [elaboration](#) of Master theses (only in Latvian) and preparation of conference [papers](#) (only in Latvian) in LLU TF website.

The students receive individual approach and feedback during programme delivery. Students are supported by university lecturers both during the lectures and laboratory works. Students can apply for individual consultations with the university lecturers delivering the course both on-site and off-site by contacting the university lecturer through e-mail (all university lecturers have individual e-mail corresponding the uniform principles name.surname@llu.lv). Students may make inquiries in academic staff consultations if they do not understand something, and consultations are scheduled for 2 or 1 hours a week per university lecturer depending on their workload.

Feedback: sittings of academic institutes take place within the framework of institutes. The following methods and principles are used for evaluation of studies:

- principle of positive performance accrual: evaluation which sums up the positive performance;
- compulsory assessment principle: students need to acquire positive assessment of compulsory programme's content;
- principle of open and clear requirements: requirements according to programme of particular

course, its goals and tasks are defined in the introductory classes and also in IS system;

- principle of assessment diversity: different forms of tests are used by including the assessments for works submitted to e-studies;
- principle of assessment suitability: content of tests must correspond to the content of particular course programme and content defined in profession standard.

According to the Law On Higher Education Institutions of Latvia and Study Regulation all student works are evaluated according to 10-point system or as “passed’ or “failed’ if it corresponds to the assessment included and approved for that particular course programme.

Feedback is ensured thanks to regular tests in the course programmes, laboratory work protocols and practical works which must be defended.

Study works are prepared as hard or soft copies (depending on particular course specifics) and student may receive assessment of their work not later than one week after submission.

Principles of student-centred education are implemented as different conferences, seminars, practical classes and laboratory works where students can demonstrate their knowledge and competences and discuss with peers and lecturers. Students can participate in different conferences organised by the Faculty of Engineering and discuss current problems and their solutions, and also read their papers, if the research has been conducted at sufficient level.

The study results in the study course programs included in the Master's study program Agricultural Engineering describe the study results, and an individual approach is also used to achieve them. The individual approach can be characterized by the option for the student either to choose the topics offered by the lecturer for passing the study work or to offer his/her own topic and coordinate it with the lecturer. Several study papers have been developed on the basis of the research objects at the students' own disposal, which allows to practically expand the practical possibilities of using the specific object and to successfully defend the master thesis. There is also a tendency that often those master's thesis are more qualitative, the results of which the student is interested in. For example, in 2021 the work was defended in the Machine Design and Production subprogram, where the student conducted a very important tribological study on medicine tablets slipping on different surfaces. The student chose the research topic already during the bachelor's studies and continued to develop until the elaboration of the master's thesis. The research direction was entirely based on the student's interests and related to his experience and the interests of the manufacturing company in which the master student worked.

The Faculty of Engineering is increasingly implementing elements of a student-centered approach that ensures students are actively involved in shaping their learning experience. When the students from several sub-programs acquiring compulsory study courses, there is a different primary level of students' background in separate study courses. In such cases, teachers can offer additional consultations and materials for learning a specific topic. Better prepared students may not perform the simplest tasks, but start with the most complex tasks according to his specific level of competence.

The lecturers of Faculty of Engineering are always very welcoming and students have felt an individual approach to issues related to studies, research and students' public life. The students it also note in the surveys.

2.4. If the study programme entails a traineeship, provide the analysis and assessment of the relation between the tasks of the traineeship included in the study programme and the learning outcomes of the study programme. Specify how the higher education

institution/ college supports the students within the study programme regarding the fulfilment of the tasks set for students during the traineeship.

In the academic Master's study programme internship "Research in Agricultural Engineering" (2 CP) is closely related to tasks of the study programme and Master's thesis, because in the internship students plan and conduct experiments, document research results, perform mathematical calculations and analyse research results and assess their credibility, prepare a presentation for conference. Direction of traineeship research matches the topic of chosen Master's thesis and involves close cooperation with the Master's thesis supervisor.

As the internship is implemented in the 3rd semester, during the internship the master student needs to conduct research on both ready-made prototypes and new prototypes. The resources needed for prototype development are sometimes provided by the support of teachers, or from Faculty of Engineering or other sources of funding. Examples include the development and research of a electric recumbent bicycle in 2020 and the development and testing of a pneumatic engine vehicle in 2016.

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

MA students usually choose their research directions according to the following criteria:

- research topic corresponds to the existing study direction and competence of the MA student;
- research direction is related to technologies and equipment to be upgraded in MA student's workplace;
- research direction is related to interests of the MA student in the field of engineering;
- research direction is related to creation and exploration of new knowledge and technologies.

Compliance of select course results with the set requirements is described in more detail in course mapping matrix.

Final papers are assessed with a grade since the academic year of 2017/18. Final papers were assessed as "passed" or "failed" until 2017. Range of assessment of the final papers varies between 6 (almost good) and 10 (excellent). Since both highly qualified university lecturers and professionals from the manufacturing are engaged in the examination commissions of the Master's theses, the theses are assessed for the applicant's practical competence and compliance of the thesis with the modern market requirements and trends. Work topics are mainly related to the following directions:

- final works related to the company where the MA student works;
- works which correspond to the development trends of modern technologies and can ensure manufacturing and introduction of new, perspective prototypes;
- works related to improvement of manufacturing company's technological process or management;
- Master's theses associated with introduction or research and development of technological

equipment for training.

The above mentioned directions of the master thesis topics in relation to the research and improvement of the production processes confirm the topicality of the developed master's thesis topics in the industry and the labor market. More than 90% of master students work in their speciality in a particular field, so the topics of master's thesis are sometimes chosen based on the interests of a particular production or service company. In the master's thesis, specific tasks are set for the introduction of the latest technologies, or for the reconstruction of old technologies, which are successfully solved and introduced into production.

The average evaluation of the Master's theses in the reporting period is 8.35 points (8.21 in 2018, 8.38 in 2019, and 8.45 in 2020). Each year several works receive the best grade - 10 (outstanding) or 9 (very good).

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

Student and alumni surveys are carried out in various ways during studies. The students can express their opinion and evaluate the academic staff member in LLU Information System twice a year.

In order to find out students' opinion, the director of the study programme organises a survey or interview of the 2nd year students. This allows finding out the students' opinion about study process, content of the study programme and organisational issues.

88% of survey respondents believe that the courses in the programme are adequate and suitable. 33% of the respondents are satisfied that studies take place on Thursdays and Fridays, and they note it allows keeping studies and career in balance. 60% believe that the training should be organized one day in person and the other remotely. 7% of respondents believe they could study also on Saturdays. 60% of survey participants think that studies could take place one day per week in the university premises and one day could be devoted to distant lectures or distant consultations.

Students from this programme are most unsatisfied with their employers (in 35% of cases) not allowing balancing study and work life, and therefore they fail to comply with programme's requirement in a timely manner. In 20% of cases students also dislike a requirement to report on Master's thesis progress at the end of each semester. 7% of the respondents do not like that they must read a paper in scientific conferences. In 30% of cases, the responsiveness of the teaching staff was positively assessed.

Courses "Engineering Research", "Computer Aided Design", "Computer-aided Measuring Systems" and "Modeling of System Dynamics" "Ergonomics and Industrial Design" are recognised as the most interesting and best prepared.

87% of students note that university lecturers usually answer the e-mails timely, they are readily available during consultations, however they wish the lecturers had more consultation time during the sessions.

The study programme has one director and 4 sub-programme managers. Sub-programme managers are responsible for organising the studies in their sub-programmes, organising the pre-defense and defense of theses. The file-keeper of dean's office organises and plans study process

of MA students in the engineering discipline.

67% of respondents named career development possibilities and 47% mentioned acquisition of new knowledge and skills whereas 13% of them mentioned a possibility of exploring and introducing new technologies in their business as the main drivers for studies.

87% of respondents believe that democracy principle between the academic teaching staff and students is maintained. 53% of students are satisfied with opportunities to participate in international exchange programmes, for example, Erasmus. 80% of students believe that the study programme is well-equipped with technical devices and laboratory equipment and also study literature.

80% of respondents believe that students have good opportunities to participate in the scientific research work by using laboratory equipment and devices in the research, to participate in the scientific conference and seminars of various levels.

Possible directions of scientific research and consultations in this direction are evaluated positively by 73% of respondents. It is noted that research topics can be chosen independently, referring to one's experience and interests.

93% of respondents evaluate cooperation with the Master's thesis supervisor, consultation possibilities and individual approach positively.

87% of MA students already worked when they started studying in the Master's programme, or they start working in the speciality during their studies. Results of MA students' surveys are analysed, and recommendations are used to improve the programme.

The main recommendations given by the employers and alumni for improvement of the programme are:

- to recommend students choosing Erasmus exchange programmes more actively;
- in case of attracting foreign students to full-time studies, some modules are expected to be delivered together with programmes in Latvian;
- to attract students to Master's study programme more actively;
- to include also elective courses in addition to compulsory study courses;
- to find a possibility to include courses related to precision agriculture, geostatics, agricultural automation and robotisation in the elective section.
- to provide ways to support students in Master's thesis elaboration, and, if necessary, buy spare parts and units necessary for prototype development.

Based on the results of the surveys and the recommendations of the employers, the revision of the study plan for all sub-programs has been started. According to the recommendations, there are two study courses "Mobile Robots" (2 CP) under development, which are intended for all sub-programs. The second study course based on recommendations will be "Use of GPS in precision agriculture" (2 CP). The beginning of teaching these courses is planned starting from 2022/23 study year, when all implementation and official approval procedures of study courses will be completed.

Due to the fact that a large number of students are in employment in industry, the surveys show the students' desire to study in person one day a week, if necessary, but the other one - remotely. After reviewing the proposal in the Methodological Commission of the Faculty of Engineering, a decision was made to identify all study courses that can be taught for one week at a remote mode, but in the other week in person (study face to face). This form of training is planned to be introduced from 2022/23 study year. During the remote studies, students who cannot attend the classes will participate in them remotely, but those who will have the opportunity to attend the classes will work in person. The implementation of the proposal will also be facilitated by the

experience gained during the Covid-19 restriction and the additionally developed distance learning materials in the e-learning environment.

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

3 students participated in ERASMUS at Czech University of Life Science programme during the reporting period. Student motivation to participate in the exchange programme is held back by relatively short study period (the exchange programme is available only in 2 semesters) and also employment of major part of the students. It was concluded from the interviews with former students who participated in the exchange programme that the main value of such studies is improved foreign languages, discovering study process in other countries and technologies offered.

There were 2 students from Kazakhstan in the incoming student mobility in the master's study program within the ERASMUS exchange program. Students were trained individually, according to an individually developed and coordinated study plan, adapting to students' wishes.

Latvia University of Life Sciences and Technologies has developed a specific procedure for the recognition of courses acquired during mobility. When a student goes to the mobility program, a protocol of academic recognition intentions is drawn up, which after returning from mobility guarantees that the study courses are recognized. The student initially chooses an exchange university. In consultation with the supervisor of the master's thesis and the director of the master's study program, appropriate study courses are selected, which in essence and content are comparable to the study courses to be acquired in the selected master's program in the engineering of the Faculty of Engineering. The student goes to an exchange program and studies the chosen study courses.

Upon returning from the exchange program, documents confirming the completion of the selected study courses are submitted to the director of the master's study program. On the basis of these documents, the acquired study courses are aligned and recognized.

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

3.1. Assessment of the compliance of the resources and provision (study provision, scientific support (if applicable), informative provision (including libraries), material and technical provision, and financial provision) with the conditions for the implementation of the study programme and the learning outcomes to be achieved by providing the respective examples. Whilst carrying out the assessment, it is possible to refer to the information provided for in the criteria set forth in Part II, Chapter 3, sub-paragraphs 3.1 to 3.3.

Study base, informative and materially technical base and financial base are sufficient and corresponding to the requirements of programme delivery and ensures achieving of learning outcomes.

The main improvements in materially technical base in the reporting period are related to donation of 9 education test benches from SIA Armgate. Hybrid vehicle simulation test bench, Common Rail diesel motor test bench, BMW output measuring test benches are intended for study process. The new laboratory premises were set up and repaired (247) - Laboratory for diagnosing vehicle control systems. Vehicles which were converted in the Motor Vehicle institute, e.g. electric vehicle *Renault Clio* and electric bicycles "UP1" and solar electric bicycle "DB&DB" developed by students are used in courses Alternative Energy Vehicles and Engineering and Environment for laboratory works. Laboratory No. 137 was commissioned in 2021 after heat-insulating the building, replacing the windows and connecting and commissioning of the new test benches. [Alternative Fuels Research Laboratory](#) bought a new generation European-level HORIBA exhaust fumes registration bench, where one can experiment with vehicle parameters in common traffic. In 2021, the laboratory also commissioned the scientific diesel motor test bench *Sierra* with options to record several work parameters while in the loading mode together with a dynamometer. The new benches can be used for elaboration of the Master's theses and conducting the scientific research work.

Classes for MA students are intended to take place in the university classrooms where 90% of them have a stationary video projector or other modern presenting options available.

The Fundamental Library of the Latvia University of Life Sciences and Technologies (LLU FB) offers a very wide information base for master students of the Faculty of Engineering. The library has purchased the search program PRIMO DISCOVERY, which provides opportunities to simultaneously search for information in subscribed and open access online databases, in the electronic Joint Catalog of libraries of national significance, in databases created by LLU FB (publications of LLU lecturers and researchers, LLU master's thesis, etc.). Access to online databases is provided 24/7 in the LLU network, it is possible to connect to subscribed E-journal and E-book databases outside the LLU network using the LLU IS user account, using the EZproxy and LLU IS user accounts. Master's students have the opportunity to obtain information in the field of engineering in the following subscribed foreign and Latvian online databases: CABI, CRC Press e-books, EBSCO eBook Academic Collection database covering a wide range of topics, EBSCO host databases Academic Search Complete, MasterFILE Premier and others, ScienceDirect J Scopus, SciVal, Web of Science, Wiley Online Journals, Google Scholar.

Information on the basic costs of one study place of the study program and costs per student in the period from 2013 to 2021 is given in Section 3.1 Description of Study Direction of Part II. The detailed materially technical provision available for students in the study direction and program is summarised in Section 3.2 Description of Study Direction of Part II and also in its Annex II-3.1-1, but detailed information on the methodological and informative provision - in Section 3.3 Description of Study Direction of Part II.

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

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

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

Qualification and composition of academic staff is relevant for provision of qualitative knowledge to programme's students, to improve their knowledge, skills and competences. LLU academic staff members according to scientific discipline, specialisation and fields are involved in delivery of the programme.

Academic staff members from the following faculties of LLU are involved in delivery of programme:

- Faculty of Engineering;
- Language Centre;
- Faculty of Economics and Social Development.

Employees representing all positions were involved in delivery of study programme in the reporting period – professors, associated professors, university lecturers, lecturers and assistants.

In the beginning of the reporting period 8 professors, 8 associated professors, 7 assistant professors, 6 lecturers and 2 assistants participated in delivery of study programme. At the end of the reporting period 13 professors, of which 3 were professors Emeritus, 5 associated professors, 3 assistant professors, 7 lecturers participated in delivery of the study programme. All academic staff members hold a doctoral degree or Master's degree in relevant field of science.

Composition of representatives of academic positions in the reporting period can be characterised as stable. The main factors influencing the structure of academic staff:

- changes in study plan, change of courses;
- defense of teaching staff's Doctoral thesis, obtaining of university lecturer's position;
- obtaining of highest academic position in relation to career development.

Comparing the composition of the teaching staff at the beginning and at the end of the reporting period, it can be concluded that the qualification of the teaching staff has generally increased, which also ensures the improvement of the quality of studies. Higher-qualified lecturers are more engaged in scientific research, attend a lot of various conferences and seminars, and integrate the latest achievements in the field into the study courses taught to master students.

The stability of the teaching staff can have a positive effect on the quality of studies, as the knowledge and teaching experience accumulated over the years ensures constant updating of the content of study courses in accordance with the current situation in the labour market and science.

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

Academic staff qualification and professional upgrade is governed by:

- LR Law on Higher Education Institutions (1995);
- Cabinet Regulation No. 129 of 25.02.2021. "Procedure for evaluation of scientific and pedagogic qualification or artistic creative work results of candidates for professor or associated professor position and those assuming this position". The Regulation describes the procedure according to which the council of professors evaluate the scientific and pedagogic qualification of candidates to professor or associated professor position;
- *LLU Regulation (only in Latvian)* on academic positions, where requirements are set forth to candidates to academic position;
- LLU academic staff motivation system;
- Efficiency assessment of the scientific activities of LLU academic staff, leading researchers and researchers.

At the beginning of the analysed period, 88.6% of academic staff members delivering the study programme were elected in their positions; 11.4% were visiting lecturers (contract for an academic year is signed), whereas at the end of said period 85.7% of academic staff members were elected and 14.3% were visiting lecturers.

Preparedness of the academic staff members is evidenced by their scientific qualification. All academic staff members involved in the study process hold Doctor's or Master's degree. Change in dynamics of university lecturers engaged in study programme Agricultural Engineering (see annex MG_11)

Qualification of academic staff members engaged in delivery of study programme fully corresponds to the requirements of study programme delivery and laws and regulations. Decrease in total number of staff in the beginning of reporting period, if compared to the final stage, is explained by exclusion of specialised courses from the programme due to difficulty in predicting the students' choice and planning of staff load. At the end of the reporting period 21 assistant professors held Doctoral degree and 13 professors and 5 associated professors were reading lectures, therefore the study programme is considered as excellent with highly qualified personnel.

Changes in academic staff qualification structure in the programme were influenced by the following factors:

- academic staff members involved in the study programme in the reporting period defended their doctoral theses and became Doctors of Engineering (2 defended doctoral degrees in Engineering);
- some university lecturers involved in programme delivery terminated employment relations with LLU (6 university lecturers).

LLU staff can periodically upgrade their qualification with the following activities:

- attending or participating in annual LLU Academic conferences;
- participating in text-books and study materials competitions;
- improving language skills in English courses;
- participating in seminars organised by the Communication and Marketing Centre;
- participating in staff mobility programme Erasmus+;
- participating in academic staff experience exchange trips to Latvian or foreign companies;
- attending professional development programme for education teachers "Innovations in University Didactics" (160 hours);
- upgrading their qualification in seminars and courses organised by different organisations.

Corresponding professional qualification of academic teaching staff and series of measures to upgrade qualification in order to ensure learning outcomes are attained at better quality.

One of the indicators of teachers' qualification is scientific publications, patents and participation in various conferences and seminars. During the reporting period, the teaching staff of the master's study program has participated in several projects, such as "Development of robotized weed control system", "Event-Based Vision for Agricultural Robots", "Development of Multiagent Robotized Intellectual System Technology" and others. Prototypes developed in projects after the end of the project are often used in the study process, for example, the electric car *Renault Clio* developed in the project is used in the study courses "Agricultural Engineering and the Environment" and "Alternative Energy Vehicles". The practical and theoretical knowledge of highly qualified teachers is transferred to students in various study courses, integrating the most important aspects of their research. The most significant projects implemented by the teaching staff are: "Development of Harvesting Technologies of Cannabis sativa L. for Product Yield with High Added Value", "Use of Electrical Power in Motor Vehicles for Humans", "Climate-friendly Livestock Husbandry Systems", "Climate Changes in Agriculture", "Agriculture Greenhouse Gas and Ammonia Emissions and CO₂ Trapping (in Arable Lands and Lawns) Marginal Abatement Cost Curve (MACC) Adjustment for use in Shaping Agricultural, Environmental and Climate Policy", "Development of Mechanization Means for Energy Crop Fuel Conditioning", "Sustainable use of natural resources to increase the quality of society".

The teaching staff of the Faculty of Engineering took part in ESF project "Improvement of the Academic Staff of the Latvia University of Life Sciences and Technologies", in which they had the opportunity to improve their English language skills and to practice in production companies related to their profile. The information obtained during the internship was integrated into the study courses, providing students with information on the latest trends in the development of engineering sciences in the Latvian industry.

4.3. Information on the number of the scientific publications of the academic staff members, involved in the implementation of the doctoral study programme, as published during the reporting period by listing the most significant publications published in Scopus or WoS CC indexed journals. As for the social sciences, humanitarian sciences, and the science of art, the scientific publications published in ERIH+ indexed journals may be additionally specified (if applicable).

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

4.5. Provide examples of the involvement of the academic staff in the scientific research

and/or artistic creation activities both at national and at international level (in the fields related to the content of the study programme), as well as the use of the obtained information in the study process.

University lecturers of the programme “Agricultural Engineering” mainly are professors and associated professors, and they actively prepare publications, which shows their contribution to the scientific work. In the reporting period they had several publications in anonymously reviewed collection of papers and they participated in international scientific conferences.

Several university lecturers engaged in more than 50 projects of different types and sizes in the reporting period. Projects can be divided into several groups by their usefulness and applicability in study programme. Main project directions where university lecturers delivering the Master’s study programme were engaged:

- Studies on use of biofuel in different vehicles;
- Studies on new fuels and their efficiency in vehicles;
- Operation properties of electric vehicles and charging infrastructure;
- Boosting of energy efficiency and exploration of energy technologies;
- Use of energy-intensive biomass, palletisation and study of other properties;
- Study of technological process of biogas production;
- Study of efficiency of electric vehicle heating solutions;
- Development of mobile agricultural robots and testing in diverse field works and weed extraction;
- Introduction of new agricultural technologies;
- Elaboration of study materials related to study process in e-studies;
- Improvement of study programme’s content according to latest market trends (see Annex 11).

2-3 academic staff members engaged in the programme have often participated in projects. However, there are also very popular research projects, e.g. “Usage of electroenergy in motor vehicles of physical persons”, contract No.2DP/2.1.1.1.0/10/APIA/VIAA/130 and “Elaboration of Mechanisation Agents for Conditioning of Energy Plant Fuel” 2010/0306/2DP/ 2.1.1.1.0/10/APIA/VIAA/ 128, where more than 10 university lecturers from the programme were involved.

Knowledge obtained in projects and developed prototypes are used for delivery of courses, for example, Embedded Programming for Engineers, Agricultural Engineering and the Environment, Testing and Calculating of Vehicles, Machine Design, Computer Aided Design of Mechanisms, Design of Technologies, Testing and Calculating of Vehicles, Project Engineering, Alternative Energetics, Automation of Technological Processes.

When researchers engage in the scientific projects, they write scientific publications and participate in international conferences where they also learn new information about recent trends in their scientific discipline. The academic teaching staff integrates this knowledge in their courses to improve and update their content.

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

Assessment Report).

Block of modules are not used in the study programme. There are two lecturers for courses "Modelling of System Dynamics", "Engineering Research", "Project Engineering", "Alternative Energy Vehicles", "Theory of Agricultural Machinery and Motor Vehicles". Courses "Agricultural Engineering and the Environment", "Specialized Technology" are delivered by three professors or associated professors. Usually, cooperation within the framework of one course is organised according to principle of individual thematic groups where lectures, laboratory works and practical works are included, rather than delivering just one form of course.

Professional and pedagogic cooperation of the academic staff members takes place during elaboration of the Master's theses, when the MA student can consult with any university lecturer of the faculty. Master's thesis is started in the first months of studies when the MA students have to choose their topics. Progress of the Master's thesis is viewed in the institute sittings at the end of semesters when the MA student and supervisor receive recommendations for improving the quality of thesis.

The academic staff members cooperate through methodological commission of the Faculty of Engineering and Council sittings where important questions concerning programme delivery and necessary changes are discussed. Members of the methodological commission assess and come up with suggestions for course improvements. This process involves elements like division of lectures and practical classes, application of evaluation methods, analysis of course content and the like.

In the next reporting period, it is intended to foster cooperation among academic staff members and attract several university lecturers for delivery of one course, inviting lecturers from other universities or suitable employers' representatives to read certain lectures to an extent possible.

The ratio of number of students and teaching staff within the framework of the study programme on the moment of submitting the self-assessment report is 9.6 The index is low due to relatively small number of students.

Annexes

III. Description of the Study Programme - 1. Indicators Describing the Study Programme		
Compliance of the joint study programme with the provisions of the Law on Institutions of Higher Education (table)		
Statistics on the students over the reporting period	MG_5_annex_Student_statistics.pdf	MG_5_pielikums_Studejoso_statistika.pdf
III. Description of the Study Programme - 2. The Content of Studies and Implementation Thereof		
Compliance of the study programme with the State Education Standard	MG_6_annex_Compliance_with_the_state_education_standard.pdf	MG_6_pielikums_Atbalstiba_valsts_izglit_standartam.pdf
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard (if applicable)		
Compliance of the study programme with the specific regulatory framework applicable to the relevant field (if applicable)		
Mapping of the study courses/ modules for the achievement of the learning outcomes of the study programme	MG_8_annex_Mapping_of_study_courses.xlsx	MG_8_pielikums_Studiju_kursu_kartejums.xlsx
Curriculum of the study programme (for each type and form of the implementation of the study programme)	MG_9_annex_Study_program_plan.zip	MG_9_pielikums_Studiju_programmas_plans.zip
Descriptions of the study courses/ modules	MG_10_annex_Descriptions_of_study_courses.zip	MG_10_pielikums_Studiju_kursu_apraksti.zip
Description of the Study Direction - Other mandatory attachments		
Sample of the diploma to be issued for the acquisition of the study programme.	MG-Diploma.pdf	MG-Diploms.pdf
Description of the Study Programme - Other mandatory attachments		
Document confirming that the higher education institution/ college will provide the students with the options to continue the acquisition of education in another study programme or at another higher education institution/ college (a contract with another accredited higher education institution/ college), in case the implementation of the study programme is discontinued	Agreement_LLU and RTU_Mehanika_EN.docx	Vienosanas_LLU un RTU_Mehanika.edoc
Document confirming that the higher education institution/ college guarantees to the students a compensation for losses if the study programme is not accredited or the licence of the study programme is revoked due to the actions of the higher education institution/ college (actions or failure to act) and the student does not wish to continue the studies in another study programme	LLU_Confirmation_Mehanika_EN.docx	LLU_apliecinajums_Mehanikas_virzienam.edoc
Confirmation of the higher education institution/ college that the teaching staff members to be involved in the implementation of the study programme have at least B2-level knowledge of a related foreign language according to European language levels (see the levels under www.europass.lv), if the study programme or any part thereof is to be implemented in a foreign language.	LLU_Confirmation_Mehanika_EN_change.docx	LLU_apliecinajums_Mehanikas_virzienam_precizets.edoc
If the study programmes in the study direction subject to the assessment are doctoral study programmes, a confirmation that at least five teaching staff members with doctoral degree are among the academic staff of a doctoral study programme, at least three of which are experts approved by the Latvian Science Council in the respective field or sub-field of science, in which the study programme has intended to award a scientific degree.		
If academic study programmes are implemented within the study direction, a document confirming that the academic staff of the academic study programme complies with the provisions set out in Section 55, Paragraph one, Clause three of the Law on Institutions of Higher Education	LLU_Confirmation_Mehanika_EN_change.docx	LLU_apliecinajums_Mehanikas_virzienam_precizets.edoc
Sample (or samples) of the study agreement	NG-Study_Agreement.pdf	MG-Studiju_ligums.pdf
If academic study programmes for less than 250 full-time students are implemented within the study direction, the opinion of the Council for Higher Education shall be attached in compliance with Section 55, Paragraph two of the Law on Institutions of Higher Education.	CoHE_Conclusion_Mg_progrr_Agricultural-Engineering-250.pdf	AIP_Atzinums_Mg_progrr_Lauks_inz-zin_250.pdf

Agricultural Engineering (43525)

Study field	<i>Mechanics and Metal Processing, Heat Power Engineering, Heat Technology, and Mechanical Engineering</i>
ProcedureStudyProgram.Name	<i>Agricultural Engineering</i>
Education classification code	<i>43525</i>
Type of the study programme	<i>Academic bachelor study programme</i>
Name of the study programme director	<i>Kaspars</i>
Surname of the study programme director	<i>Vārtukapteinis</i>
E-mail of the study programme director	<i>kaspars.vartukapteinis@llu.lv</i>
Title of the study programme director	<i>Profesors, Dr.sc.ing.</i>
Phone of the study programme director	<i>29250437</i>
Goal of the study programme	<i>The aim: to train qualified, creative and competent specialists in the sphere of agricultural engineering who could: - successfully work in engineering-technical, manager, government and municipality posts related to agricultural machinery or autotransport fields; - continue studies at the Master Degree programme in agricultural engineering and related study programs and self-educate.</i>
Tasks of the study programme	<i>The tasks: - To understand and acquire nature and society development correlations, basics of management psychology and management skills through general education disciplines (applied psychology, philosophy, theory of economics, principles of rights, informatics, ecology and environmental protection, labour and civil protection, entrepreneurship, principles of management); - To acquire the structure and principles of operation of machines, mechanisms, and energetic devices, technologies of their operation processes and solution of related engineering tasks through engineering science fundamental disciplines (mathematics, physics, chemistry, heat engineering, electrical engineering and electronics, hydraulics and fluid power drive, dynamics of machines, strength of materials, theoretical mechanics, material science, mechatronics, descriptive geometry, engineer graphics etc.); - Through special disciplines forming the basis of subprograms: - In agricultural machinery - to acquire the principles of agricultural technological processes, up-dated mechanized technologies, machinery applied in their implementation, basic principles of machinery formation and design, efficient usage and service of machinery, renovation of operational abilities of machines and technological equipment; - In autotransport - to acquire technologies and machinery used in autotransport, evaluation of their suitability and principles of efficient application, related methods of solution of technical and organizational tasks in freight and passenger transportation, automobile and spare part marketing, traffic organization and management.</i>

Results of the study programme	<p>The graduate, who will pass all stages of the study program, will have the following knowledge, skills and competences:</p> <ul style="list-style-type: none"> - and critical understanding of this knowledge about fundamental regularities of engineering sciences, the basic principles of machine and mechanism construction, operation, design, selection and exploitation in the field of agricultural machinery or autotransport, besides a part of the knowledge corresponds to the highest achievement level of the subprogram fields; - skills in choosing the most appropriate machinery and rational technological solutions, maintenance of the optimal regimes in machine operation and renovation of capacity of labour, design of simple machine parts and units as well as organisation and management of business in the sphere of operation and maintenance of agricultural machinery or autotransport; ability to carry out professional, innovative or research work, formulate and describe analytically information, problems and solutions in the sphere of the speciality, to explain and argue about them with specialists and lay persons; ability to structure own further education independently, promote own further education and professional development as well as further education and professional development of the subordinates, demonstrate scientific approach in solving problems, take responsibility and show initiative working individually, in a team or managing the work of other people, take decisions and find creative solutions in changing or uncertain conditions; - competence in evaluation of the technical condition, operational quality and technical-economical parameters of agricultural machinery or autotransport; ability to obtain, select, analyse and use information; take decisions and solve problems in the sphere of speciality; demonstrate understanding of professional ethics, evaluate the influence of own professional activities on environment and society.
Final examination upon the completion of the study programme	Bachelor 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)	160
Admission requirements (in English)	General secondary education or vocational secondary education
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	Bachelor Degree of Mechanical Engineering
Qualification to be obtained (in english)	-

Places of implementation

Place name	City	Address
Latvia University of Life Sciences and Technologies	JELGAVA	LIELĀ IELA 2, JELGAVA, LV-3001

Part time extramural studies - 5 years - latvian

Study type and form	<i>Part time extramural studies</i>
Duration in full years	5
Duration in month	0
Language	<i>latvian</i>
Amount (CP)	160
Admission requirements (in English)	<i>General secondary education or vocational secondary education</i>
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	<i>Bachelor Degree of Mechanical Engineering</i>
Qualification to be obtained (in english)	-

Places of implementation

Place name	City	Address
Latvia University of Life Sciences and Technologies	JELGAVA	LIELĀ IEĻA 2, JELGAVA, LV-3001

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

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

Parameters of the study programme have not changed since previous accreditation.

1.2. Analysis and assessment of the statistical data on the students of the respective study programme, the dynamics of the number of the students, and the factors affecting the changes to the number of the students. The analysis shall be broken down in the different study forms, types, and languages.

Information in Annex LI_5 shows that the number of programme's students in previous reporting period decreased generally from 249 on 1 October 2013 to 122 on 1 October 2020. Decrease of number of students is proportionally similar both for full-time and part-time studies. Decrease of number of students is related to smaller number of students admitted – from 78 in 2013 to 21 in 2020. With the 3rd study year the study program is divided into two sub-programs - Agricultural Machinery and Autotransport. As the information on the reporting period summarized in Annex LI_5 shows, there is no significant difference between the trends in the sub-programs. Number of students who discontinued studies vary between 13 and 27%. Main causes of discontinuation of studies are insufficient previous preparedness in fundamental engineering courses – in mathematics and physics and also volatile interest in area of studies chosen. This process has a known history. Professional study programme Agricultural Engineering was created with a support from students and entrepreneurs in 2000. Initially it had a support, but interest rapidly decreased and in 2008 this programme was closed, because students and applicants chose the academic programme as priority. Number of applicants in previous reporting period decreased significantly and management of the programme and faculty decided it was necessary to transform the academic programme into professional Bachelor programme. It was intended to transform the programme for another accreditation in 2019. Then it turned out the programme could be transformed only after the accreditation. Besides, accreditation term was extended for two years. Right after accreditation, the programme will be transformed into professional Bachelor's programme. Over the course of studies, study renewal takes place in accordance with general procedure of LLU; as information in annex LI_5 shows, the number of students who renew for the studies is not large (2-5) if compared to those who discontinued studies (19-43).

During the reporting period the studies in the program were implemented only in Latvian. A new academic bachelor's study program in *Biosystems Machinery and Technologies* was licensed for implementation in English.

1.3. Analysis and assessment of the interrelation between the name of the study

programme, the degree or professional qualification to be acquired or the degree and professional qualification to be acquired, the aims, objectives, learning outcomes, and the admission requirements.

Name of the study programme Agricultural Engineering is equal to courses titled so elsewhere in Europe and world. The programme includes two sub-programmes: *Agricultural Machinery* and *Motor Vehicles*. The programme's title fully concords to the Agricultural Machinery section, whereas only partially to the *Motor Vehicles* section. This is also one of reasons why the number of applicants decrease, because the largest reduction is seen especially in sub-programme Motor Vehicles. The special courses of sub-programme's direction totally yield 36 credits or 22.5% of total volume of the study plan.

The programme is academic, degree to be obtained is Bachelor Degree of Mechanical Engineering. At the creation stage traineeships with volume of 14 credits (4 credits for study traineeships and 10 credits for professional traineeships) were included in the programme. When preparing for programme's transformation into professional Bachelor's programme, the programme director joined the [council of experts](#) of Metal Processing, Machine Building and Machine Science [Industry](#) of Latvian Confederation of Employers. Directors of graduate and postgraduate level of Agricultural Engineer programmes are involved in a work group preparing the Motor Vehicle Engineering Profession Standard, whereas the director of professional undergraduate programme Machine Design and Production – in preparation of professional standard of the Mechanical Engineer.

Goal of the programme is to prepare highly qualified, creative specialists of agricultural engineering with an open mind-set who could succeed working as technical engineers, managers, in public administration and municipalities related to fields of agricultural machinery and motor vehicles, and also continue graduate studies in agricultural engineering and related programmes.

Programme's tasks in their turn are aimed at achieving goals both in area of fundamental and theoretical knowledge which lays the basis for further education and area of professional knowledge which paves the road for future professional activity in rather wide range of activities.

Study results in their turn are closely linked to the results defined in the programme's goals – highly qualified, creative specialists with wide perspective.

A mandatory [requirement](#) for programme admission is assessment of centralised examination in Latvian, foreign language and mathematics. Additional assessment is provided by the centralised examination in physics because mathematics and physics are fundamental disciplines of the engineering science.

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

2.1. Assessment of the relevance of the content of the study course/ module and the compliance with the needs of the relevant industry and labour market and with the trends in science. Provide information on how and whether the content of the study course/ module is updated in line with the development trends of the relevant industry, labour market, and science. In case of master's and doctoral study programmes, specify and

provide the justification as to whether the degrees are awarded in view of the developments and findings in the field of science or artistic creation.

The study programme was created in compliance with the [Regulation on national academic education standard](#), which states that content of the Bachelor's study programme allows attaining scientifically substantiated wide-profile learning outcomes. For descriptions of study courses, see annex LI_10.

The study programme will contribute to all three [smart specialisation directions of Latvia](#): change of manufacturing and export structures in traditional economy industries; future development in industries where there are or it is possible to create products with high added value; and industries with significant horizontal impact and contribution to transformation of the economy. Programme Agricultural Engineering is related to RIS3 Smart Specialisation areas: "Knowledge intensive bioeconomy", "Smart materials, technologies and engineering systems, and to some degree also "Smart energetics". It falls within several development priorities: 1. More efficient use of pre-processing of products in manufacturing products with higher added value, creation of new materials and technologies and diversification of use; 3. Improvement of energy efficiency, which includes creation of new materials, optimisation of manufacturing processes, introduction of technological solutions, use of alternative energy resources and other solutions; 5. Modern education system which meets the requirements of future market demands and promotes transformation of economy and competences, entrepreneurship and creativity development necessary for implementation of VSS priorities at all education levels; 6. Developed knowledge base (fundamental science and science infrastructure) and human capital in fields of knowledge where Latvia is relatively competitive and which are important for economy transformation; 7. Gathering information about resources in territories and specialisation by putting forth prospective economic development opportunities, incl. leading and prospective directions of business in municipal territories.

The Ministry of Economy [in their report](#) (p. 67) predicts lack of specialists with higher education in engineering sciences, manufacturing and construction both in 2020 and 2027 at 15%. Jelgava City Development Programme 2014-2020 states that the city focuses on promotion of industrialisation and development of support infrastructure, the city traditionally develops industry and due to availability of qualified labour force Jelgava has been able to attract new industrial companies.

Jelgava City [Development Programme](#) 2014-2020 emphasizes (p. 27): *Scientific and research potential of the city is related to Latvia University of Agriculture. (LLU), which could serve as the basis for creating new, innovative products and technologies. LLU scientists conduct research in food technology, **agriculture, energy, transport**, forestry and wood processing, environmental, veterinary medicine and other fields. Results of the scientific research open new development possibilities for entrepreneurs of adjacent territories which were not utilised sufficiently until now.* It is said in p. 29: *Companies in Jelgava basically operate in the following industries: wholesale, retail, vehicle repair (673 companies), professional, scientific and technical services (297 companies), transport and storage (205 companies), construction (201 companies) and processing industry (173 companies).* Also, academic staff members of the programme are involved in R&D projects of Jelgava city in transport and other fields.

Within the framework of ESF project [Improvement of LLU Management](#) a sub-project Services of Industry Experts for Evaluation of the Content of Study Programmes and Providing Recommendations was implemented in 2019 and 2020. Programme's expertise was run by SIA Temeso by involving 10 experts of various fields who have graduated the programme in different

times. Main conclusions of the expertise was: study sub-programmes, in fact, are relevant for the industry; the programme is comprehensive, courses to be acquired introduce students to basic exact fundamental knowledge and also humanitarian and social knowledge; a very positive indication is that students in shared courses are taught from three different angles which are nevertheless fundamentally important – metal processing technology, mechanics and automation, and it matches the industry representatives' demand for employees with a general understanding of wide range of issues, i.e. starting from mechanics and machine elements to electronics, electrical engineering and automation; all in all, the content (plan) of the programme essentially covers all the necessary knowledge so that the student could successfully start working in relevant industry and position. Of course, the expertise also provided recommendations and proposals for improvement of the programme. On the basis of these suggestions, the plan for improving the study programme until 2023 was prepared (see in annex 2_part_2). On 28.08.2020, this improvement plan was discussed when industry representatives met with student representative and directors of TF institutes.

2.2. Assessment of the interrelation between the information included in the study courses/ modules, the intended learning outcomes, the set aims and other indicators, the relation between the aims of the study course/ module and the aims and intended outcomes of the study programme. In case of a doctoral study programme, provide a description of the main research roadmaps and the impact of the study programme on research and other education levels.

The goal of the programme is to prepare highly qualified, creative specialists of agricultural engineering with open mind-set who could succeed working as technical engineers, managers, in public administration and municipalities related to fields of agricultural machinery and motor vehicles, and also continue graduate studies in agricultural engineering and related programmes and continue graduate studies both in agricultural engineering and related programmes. Meanwhile, the goals of individual courses are individual contribution into achievement of the common goal of the programme.

After completing the course the students will have: **knowledge** and critical understanding of this knowledge about fundamental regularities of engineering sciences, the basic principles of machine and mechanism construction, operation, design, selection and exploitation in the field of agricultural machinery, autotransport or food engineering, besides a part of the knowledge corresponds to the highest achievement level of the subprogram fields; **skills** in choosing the most appropriate machinery and rational technological solutions, maintenance of the optimal regimes in machine operation and renovation of capacity of labour, design of simple machine parts and units as well as organisation and management of business in the sphere of operation and maintenance of agricultural machinery, autotransport or food engineering equipment; ability to carry out professional, innovative or research work, formulate and describe analytically information, problems and solutions in the sphere of the speciality, to explain and argue about them with specialists and lay persons; ability to structure own further education independently, promote own further education and professional development as well as further education and professional development of the subordinates, demonstrate scientific approach in solving problems, take responsibility and show initiative working individually, in a team or managing the work of other people, take decisions and find creative solutions in changing or uncertain conditions; **competence** in evaluation of the technical condition, operational quality and technical-economical parameters

of agricultural machinery, autotransport or food engineering equipment; ability to obtain, select, analyse and use information; take decisions and solve problems in the sphere of speciality; demonstrate understanding of professional ethics, evaluate the influence of own professional activities on environment and society.

The study program in general consists of two main parts - the compulsory courses of the program (98 CP) and the sub-program courses (36 CP). The common courses of the program, the knowledge, skills and competencies acquired in them form the general basis of engineering, which is common to both sub-programs. They form the basis for the successful and comprehensive acquisition of the courses of the respective sub-program. They are designed in accordance with the Cabinet of Ministers 13.05.2014. Regulation No. 240. In turn, the knowledge, skills and competencies acquired in the sub-program courses are further developed by the knowledge, skills and competencies acquired in the compulsory courses already in a specific application. Examples include common courses such as Material Science, Theoretical Mechanics, Strength of Materials or Dynamics of Machines. In the compulsory section of studies, students acquire these courses, acquire specific knowledge, skills and competencies. Further in the sub-program courses, this knowledge, skills and competencies are already the basis for the successful acquisition of Agricultural Machinery, Livestock Mechanization and Motor Vehicles in the Agricultural Machinery sub-program. It is similar with the Motor Vehicle Construction, Theory of Engine and Automobiles, and also the Technical Service of Automobiles in the Autotransport sub-program. In this way, based on the logical and substantive succession, the general knowledge, skills and competencies of the program are formed, which in general form a sufficiently broad profile specialist with sufficiently deep knowledge at the bachelor's level.

The interrelation of results between the study program and the study courses can be seen in the mapping of the study courses (see annex LI_8).

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

LLU Development [Strategy](#) 2015 - 2022 (p. 48) defines main principles of education development: quality, integration of education and research, coherence of goals and interests of parties involved.

Fundamental principles of LLU, study process, general principles of organisation and evaluation thereof are governed by LLU Study Regulation. Study process consists of contact lessons and independent studies requiring a certain amount of work to be done by the student subject to assessment. [E-studies](#) and its principles are used increasingly more in the study process. Study results are evaluated individually. Information about conditions and assessment criteria of acquisition of each course is included in the course [register](#) available on LLU website.

Study Regulation contains a wide individual section (4. Learning Outcomes) revealing information about learning outcomes and their assessment.

Diversity of students' needs is respected and taken into account within the framework of studies, by creating suitable learning pathways to an extent possible; multiform teaching methods are applied

depending on situation; students are encouraged to be independent, at the same time ensuring guidance and support from the academic staff; mutual respect between students and academic staff is promoted; there are certain procedures in the Study Regulation for solving student complaints.

Point 1.3 of the [Standards](#) and Guidelines for Quality Assurance in the European Higher Education Area adopted by the Ministers responsible for higher education in the European Higher Education Area in 2015 is devoted to student-centered education. In the implementation of the program, LLU tries to be guided by the above-mentioned seven basic principles of student-centered learning and teaching, as well as the above-mentioned principles of knowledge assessment. Respect for the diversity of the student contingent and its needs is most clearly implemented in the courses section of the sub-programs. Students have a choice of internship places, and internship companies are staffed according to the student's interests, and field trips are organized largely based on the students' interests. Students also have the opportunity to choose not only the topics of bachelor's theses from those offered at the faculty but also to offer them themselves. Often, bachelor's theses address specific topics relevant to student farms. The different types of implementation of the program are manifested both in the form of full-time and part-time studies. The COVID pandemic situation confirmed the readiness to implement the program remotely, if necessary, using the prepared e-learning resources. The use of different pedagogical methods was partly reflected in the previous sentences. Regular assessment of applied teaching methods and pedagogical methods takes place in the form of feedback not only through direct discussions with students but also through regular surveys both within the study course and the program. Students' tendency to independence is specially promoted in the process of preparation of course works and projects, as well as bachelor's theses, where students have the opportunity to solve specific tasks to a large extent independently. Students' tendency to independence is very successfully implemented in students' self-government, motivating students' participation in organizing various student events. One of the bright examples is the Days of students (Mehu dienas) of the faculty organized by the students themselves. In this event, students not only organize the program, but themselves attract sponsors, the number of which usually reaches several dozen, most of whom are faculty graduates. You can also find out about it on the [website](#) (only in Latvian) of the Faculty Alumni Association. The principles of knowledge evaluation are defined in the Study Results section of the LLU [Regulation](#) of Studies. The study regulations have a separate section (5th Appeal), which describes both the procedures for submitting and reviewing appeals. LLU has a Regulations of Academic Integrity, which regulates the principles of academic integrity.

The study program is divided into sub-programs, starting with the 5th semester in full-time studies and the 6th semester in part-time studies. Students choose a sub-program in the 4th semester. The common courses of the program are organized jointly for both sub-programs, but the individual courses of the sub-programs - for each sub-program separately.

Paragraph 1.1.42. of the LLU [Regulation](#) Studies stipulates that in full-time studies "the amount of classes for 1 credit point is not less than 16 contact hours", but 1.1.65. provides that in part-time studies "the student acquires a part of the content of the study program independently and the amount of lessons for 1 credit point is up to 8 contact hours". Thus, if one CP corresponds to 40 hours, then in full-time studies no more than 24 hours are left for independent work, but in part-time studies - at least 32 hours. In its turn, paragraph 2.2.1. provides that "The scope, content and requirements of studies in full-time and part-time studies are the same."

2.4. If the study programme entails a traineeship, provide the analysis and assessment of the relation between the tasks of the traineeship included in the study programme and

the learning outcomes of the study programme. Specify how the higher education institution/ college supports the students within the study programme regarding the fulfilment of the tasks set for students during the traineeship.

The basic principles of organisation of LLU traineeships are governed by LLU Traineeship Regulation.

The programme includes two study traineeships - Metal Processing Traineeship in volume of 2 credits where students acquire elementary metal processing skills and also learn about metal processing in modern metal processing work benches in faculty's study workshops.

The second one is Technological Study Traineeship in volume of 2 credits where students head to study trips depending on the sub-programme to learn about modern agricultural machinery or motor vehicle sales and maintenance companies with technologies used there and organisational basic principles.

The mission of technological professional traineeship (6 credits) is to strengthen the knowledge and practical skills in operating tractors or motor vehicles (depending on sub-programme), whereas the mission of the Professional Traineeship of Engineering Service (4 credits) is to learn and master organisational and managerial aspects of engineering service.

All the mentioned aspects are closely linked to knowledge, skills and competences defined in the programme.

The list of companies in which students have practiced during the reference period is shown in annex LI_11.

LLU support for students to achieve the tasks set within the internship is manifested in two main aspects. First of all, within the framework of each study course, the lecturers emphasize the connection of the knowledge, skills and abilities acquired in the course with their application in practice, referring to specific examples from the respective field. Secondly, students are offered a list of recommended internship places (see Part II, Annex 11 - 2_part_11_annex_Practice_provision). The companies on the list offer internships themselves. In its turn, the faculty is convinced of the ability of these companies to ensure the achievement of the tasks set within the practice.

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

Students develop a bachelor's thesis in the final semester of studies (in full-time studies in 8th semester, in part-time studies - in 10th semester). The elaboration of a bachelor's thesis is regulated by methodological [regulations](#) (only in Latvian) approved by the faculty council.

Within the bachelor's degree, the student independently solves a specific task in the respective direction of the study program. The bachelor's thesis confirms the student's ability to independently perform engineering and/or fulfillment of the scientific task. The topics of bachelor's theses are offered by the faculty members as well as entrepreneurs. Students are also given the opportunity to offer topics of interest to them. Often students offer topics of interest to themselves or family

businesses and address practical topics relevant to entrepreneurship in their bachelor's theses. Such topics can be seen in the list of developed bachelor's thesis topics in annex LI_12. The student must choose the topic of the bachelor's thesis by the end of the penultimate study semester, but students are encouraged to choose the topic of the bachelor's thesis before the beginning of the 4th year. Students spend the first twelve weeks of the 4th year in internships, they start with a two-week internship, followed by a 10-week professional internship. During the internship, the student has the opportunity to purposefully collect materials for the bachelor's thesis and in some cases also to perform part of the planned experiments. This can be especially important in the Agricultural Machinery sub-program, where students sometimes choose bachelor's thesis topics related to crop vegetation.

The topics of the bachelor's theses are related to the development of new technologies, design of production processes of companies or their parts, creation of new machine constructions or improvement of existing ones. The proposals and developments recommended in the work require economic substantiation, compliance with nature and labor protection requirements.

Bachelor's theses are evaluated by the State Examination Commission, which consists of three professors of the faculty and four external members: Deputy Head of Ulbroka Science Center, Director of the State Technical Control Agency of Latvia, Member of the Latvian National Association of Land Vehicle Sworn Experts and Chairman of the Board.

The average evaluation of bachelor's theses varies slightly from year to year: 2020 - 7.7, 2019 - 8.23, 2018 - 7.7, 2017 - 7.39, 2016 - 8.05. Almost every year there are works that the commission evaluates with the grade "excellent": 2019 - 2, 2018, - 2017 - 2, 2016 - 4.

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

LLU calls students to take part in anonymous survey on study courses and academic staff and to provide their commentaries in LLU information system at the end of each semester. Students may provide their assessment of 6 questions in this survey. Students are generally not very responsive, which does not allow evaluating the survey results convincingly and objectively. There were 93 courses included in the survey in autumn semester of 2020. There are no answers received for 35 courses in total, and 15 courses received 1 assessment each, and only 19 courses had more than 10 evaluators. Evaluations of the courses and academic staff where there were at least two evaluators, vary between 4.08 and 4.81.

Students have to fill out questionnaires outside their centralised survey in the programme for three times - in the 1st, 2nd and 4th year.

The first year's survey traditionally takes place in October, aiming at finding out the argumentation behind the programme choice and the first impressions of studies. 22 questionnaires were gathered from the survey of October 2020. 64% of students chose the study programme due to their interest in engineering, 18% considered a possibility to master another programme while 13% chose because their parents are farmers. The survey highlights two main arguments in favour of the choice of programme - employment opportunities (52%) and interest in engineering (34%). 40% of respondents found programme-related information in internet, 14% learned it from faculty's students and 10% from friends. 42% of students attended open doors days of the faculty before the

studies. 83% of respondents praised registration process, 14% admitted it to be neutral and one claimed it to be complicated. 27% of students pointed out that first impressions in studies were very good and 73% – as good. 13% of students told in commentaries that academic teaching staff have positive attitude towards students, 9% noted diversity of extra-curriculum activities.

The survey of second year students (15) in October 2020 revealed that only one student could not answer the question if he/she still believes the choice of study field to be correct. Mathematics, Physics and Theoretical Mechanics are traditionally recognised as the most complicated study courses. Students also came up with some suggestions regarding improvement of study process. A collection of survey results was sent to directors of the institutes and heads of departments, courses of academic staff members of which were mentioned in the survey.

Students of graduation year are surveyed during defense of the Bachelor thesis. 17 full-time and 4 part-time students of the graduation year were surveyed in early June 2020. All students have good understanding of the goal and tasks of study programme and also study organisation. Asked if they were satisfied with place of courses in the programme and their content, 17 respondents gave confirming answers, five told they would like to have larger volume of practical classes. Students are most satisfied with: qualified and accommodating teachers (in 67% of responses), practical classes (28%), new study materials and their availability (24%). The survey also asked what courses and which aspects were most and least satisfying for students (teaching methods; description of content and expected outcomes; use of computers, multimedia and internet; availability of consultations and their content). Results of survey were collected and sent to the institutes' directors for their information and disposal. Impartiality of evaluation was praised positively by 86%, three surveys did not answer to this question. 90% of respondents admitted that democracy principles were observed in the study process, and two questionnaires did not provide answers. 48% told that they like an opportunity given by ERASMUS programme to study in other higher education institutions, 33% have not used this opportunity and two respondents would like to have broader possibilities.

Survey of programme alumni shows their main employment areas to be: private business – 25%, farms – 14%, foreign companies – 8%, car service companies – 7%, local governments and forestry – 2% each. Main job tasks of alumni at the workplace: production – 14%, administrative work and sales – 13%, management of work teams, operation and servicing of machinery/equipment – 12%, information gathering – 9%, solving of strategic issues in company – 6%.

Employers in the surveys stress a need to update the material base. This emphasis is taken into account both doing modernisation within the framework of ERAF [projects](#) (only in Latvian) and also [entrepreneurs'](#) (only in Latvian) material [support](#) (only in Latvian), and also organising study trips of [students](#) (only in Latvian) and [academic staff members](#) (only in Latvian) to the leading companies of industry.

Within the framework of ESF [project](#) (only in Latvian) industry experts were attracted to evaluate the study programmes. The experts' main conclusions were: study direction sub-programmes, in fact, are relevant for the industry; the programme is comprehensive, courses to be acquired introduce students to the basic exact knowledge and also humanitarian and social knowledge; a very positive indication is that students in shared courses are taught from three different angles which are nevertheless fundamentally important – metal processing technology, mechanics and automation, and it matches the industry representatives' demand for employees with a general understanding of wide range of issues, i.e. starting from mechanics and machine elements to electronics, electrical engineering and automation; all in all, the content (plan) of the programme essentially covers all the necessary knowledge so that students could successfully start working in relevant industry and position.

Experts of the industry also came up with their proposals for improvement of programme's content.

1. To make sure if all lecturers of study courses update their materials with the latest information and trends of industry - academic staff members regularly update their study materials;
2. Course Introduction to Studies must be transformed into a course where students attend different factories to see their future perspective after the studies - they take some study trips to most characteristic companies of the industry;
3. Descriptive Geometry and Engineering Graphics must be merged, to introduce to the principles of drawing, conditions and standards of the new course, but to devote most of time to learning computer software AutoCad (basics), SolidWorks and Inventor - the proposal is being implemented and currently course Engineering Graphics is being transformed and it already includes basics of AutoCad;
4. To attract visiting lecturers to study courses - professionals from relevant industry/profession wherever possible - visiting lecturers are invited to either individual courses or lectures of companies' professionals are organised within the framework of technological study traineeship;
5. To organise internship of academic staff in Latvian companies.

Within the framework of ESF [project](#) of 2020, three academic staff members from the programme had internship in companies, and four academic staff members continue studying.

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

Information on mobility possibilities for students is available on LLU [website](#). Programme's students most often go to Czech University of Life Sciences in Prague since its programme is closest and most compliant with the content of LLU programme. Three exchange programme students studied in Prague in autumn semester of 2013, one in 2015, three in 2016, three in 2018 and two in spring semester 2019. One student of the programme studied in Kazimierz Pulaski University of Technology and Humanities (Poland) in spring semester 2019. List of courses to be acquired and substituted is harmonised before mobility programme implementation and all the courses acquired were fully aligned according to the university's reference after returning. In general, students do not use all possibilities of mobility even though management of programme and faculty encourage students to use this opportunity.

Statistical data on student mobility can be found in annex 2_part_9.

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

3.1. Assessment of the compliance of the resources and provision (study provision, scientific support (if applicable), informative provision (including libraries), material and technical provision, and financial provision) with the conditions for the implementation of the study programme and the learning outcomes to be achieved by providing the respective examples. Whilst carrying out the assessment, it is possible to refer to the information provided for in the criteria set forth in Part II, Chapter 3, sub-paragraphs 3.1 to 3.3.

The most important materially technical provision available for students in the study direction and programme is summarised in Section 3.2 Description of Study Direction of Part II and also in its annex II-3.1-1. Absolute majority of equipment listed in the annex are used in education of programme's students. A small overview of study [process](#) and also materially technical base can be obtained in faculty's website.

The informative base of the study programme is provided mainly by the Fundamental Library of LLU founded in 1939; its [funds](#) contain resources on scientific disciplines: agriculture – 38%, social sciences – 24%, machinery – 19%, natural sciences – 10% and other scientific disciplines – 9%. Information sources not contained in the library's funds can be ordered via interlibrary subscription. One can order books and other documents located in other libraries of Latvia as well as documents from foreign libraries or document supply centres.

All students and academic staff members can enter LLU informative system (henceforth – LLU IS) with their username to view e-book databases Taylor & Francis Group, CRC Press and EBSCO eBook Academic Collection e-books and e-journal databases EBSCO databases, ScienceDirect journals and Willey Online Journals.

In order to make studies easier, a study course [register](#) has been created where students can read course descriptions, get information about course acquisition, assessment requirements. Academic staff members widely use LLU e-studies [system](#) where study materials are placed, tests organised, home assignments submitted etc. in the study process. Each student has their username to track their study process in LLU IS.

LLU Fundamental Library provides good opportunities to get textbooks and scientific literature. One of the main tasks of the library is to gather all publications from Latvia and — to an extent possible – from abroad, on machine science, field crop, horticulture, agriculture economy, nature science, agricultural machinery, livestock husbandry, veterinary medicine, food production and nutrition science, housekeeping, wood processing, forestry and other fields. The library has abundant range of nature science, engineering and social science publications. It is possible to get interlibrary subscription services.

Industry publications for studies and research are available in the Subscription, Textbook subscription, Reading-room, UN Food and Agriculture Organisation repository library. Factual and bibliography references to various agriculture and other industry related issues can be received in the Bibliography Information Department.

Academic staff members are informed about temporary access databases. Databases containing academic staff publications and doctoral theses have been created. Library employees consult on topical issues and also advise students on search of the scientific information.

LLU informative and methodological base is detailed, transparent and structured to ensure a quick access for students to studies related information, see course materials and acquisition requirements in e-studies and also LLU Fundamental Library provides to students very wide range of study and scientific literature and access to diverse databases.

LLU foreign students study since the academic year of 2015/2016 and LLU has translated numerous documents. There are some regulatory [documents](#) available for public in the English language. Different application forms are available for students in dean's office of the faculties.

Detailed information on the methodological and informative provision is given in Section 3.3 Description of Study Direction of Part II.

Information on the basic costs of one study place of the study program and costs per student in the period from 2013 to 2021 is given in Section 3.1 Description of Study Direction of Part II.

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

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

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

List of academic staff members involved in the study programme across study years with qualifications is given in annex 2_part_3.

48 academic staff members were involved in the programme in academic year of 2020/2021, of them 30 men and 18 women.

Number of academic staff members across years has varied in the reporting period: 58 in 2014, 60 in 2015, 63 in 2016, 68 in 2017, 65 in 2018, 63 in 2019. No considerable changes have taken place in the qualification structure of academic teaching staff.

As the qualification of the teaching staff in the program has not changed significantly during the reporting period, the quality of studies has not changed significantly due to this aspect.

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

Statistics of the study year 2020/2021. 60.4% of total number of academic staff members hold doctoral degree and 60.4% of academic staff members are elected in their positions. Out of total number of academic staff members: 8 professors, 3 professors Emeritus, 9 associated professors, 10 university lecturers, 3 lecturers, 4 visiting university lecturers and 11 visiting lecturers. 27 academic staff members also assume researcher position – 21 of them are leading researchers and 6 – researchers. Only two of 28 academic staff members in the programme who are elected in their positions do not have doctoral degree, hence 92.9% of persons elected have PhD. Paragraph Three

of Article 3 of the Law on Higher Education Institution states that at least 65% of persons elected in the academic positions must have PhD. See the CV of the teaching staff in annex 2_part_4.

Table 2

Parameter	Year				
	2020	2019	2018	2017	2016
Publication in issues included in Web of Science or Scopus	48	44	50	47	41
Publications in anonymously reviewed international scientific periodicals	2	19	2	5	18
Scientifically popular and scientifically methodological publications	7	9	13	34	19
Number of papers in international scientific conferences	53	59	52	26	17
Patents received	4	1	2	2	2
Participation in scientific projects	9	8	10	9	8
Participation in education and infrastructure projects	6	6	4	2	-

The impact of the qualification of the academic staff on the study results can be assessed in two aspects. First of all, the higher the formal qualification of the lecturer - position and scientific degree, the greater the pedagogical and research experience of the lecturer. It enables students to provide both theoretically and practically more substantiated argumentation within the framework of their study course through more experience, through higher pedagogical and scientific qualification. It helps to achieve higher study results.

Qualification of the academic staff members promotes [engagement](#) (only in Latvian) of students and graduate students in research, as well as international cooperation of academic staff members (see annex 2_part_6 and table 2).

Information obtained during the studies is included whenever the study materials are regularly updated. It is also important to stress interaction in this aspect: academic staff member (researcher) - student, in undergraduate studies, especially within the framework of Bachelor thesis. Bachelor theses from previous years can be given as examples. One of directions of the Motor Vehicles Institute is biofuel and use of it in motor vehicles. The following Bachelor theses were devoted to this topic in 2020: *Possibility to Use Biogas in Company SIA "Dobeles Autobusu parks"*, *Use of Compressed Natural Gas in Urban Public Buses*. Research field of the agricultural machinery professor is pre-treatment and storage of grains, in 2020 under his supervision student elaborated his Bachelor thesis *Research of Grain Moisture Dynamics in Grain Storehouse*. In 2019, student elaborated Bachelor thesis under the supervision of professor *Efficiency of Applying Solar Panels to Farm "Jasmīni"*. A joint research was continued and in 2020 it resulted in a joint [report](#) for a conference (8th section *Renewable and conventional energy*) and an [article](#) from the collection of conference papers.

22 of the lecturers of the program are doctors of sciences in the sub-branch of agricultural engineering. Mathematics is taught by two doctors of mathematics (Dr.math.); Entrepreneurship - Doctor of Economics (Dr.oec.); Physic - two doctors of physics (Dr.phys.). The research directions of the teaching staff are quite closely related to the courses they teach. This can be ascertained by comparing the information provided in appendices 2_part_3_annex_Teaching_staff and 2_part_4_annex_CV.

4.3. Information on the number of the scientific publications of the academic staff members, involved in the implementation of the doctoral study programme, as published during the reporting period by listing the most significant publications published in Scopus or WoS CC indexed journals. As for the social sciences, humanitarian sciences, and the science of art, the scientific publications published in ERIH+ indexed journals may be additionally specified (if applicable).

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

4.5. Provide examples of the involvement of the academic staff in the scientific research and/or artistic creation activities both at national and at international level (in the fields related to the content of the study programme), as well as the use of the obtained information in the study process.

27 academic staff members, in parallel to their academic position were elected as leading researchers or researchers. Participation of the academic staff in the scientific research is reflected in annex 2_part_6; Scientific research engagements were also reflected by scientific publications both in internationally reviewed scientific [publications](#), included in Web of Science or Scopus scientific databases, and publications in anonymously reviewed international scientific publications, and scientifically popular and scientifically methodological publications, and papers for international scientific conferences, and patents received, and participation in scientific projects (annex Participation_teaching_staff_projects). The results of research are reflected in the table 2 of the Section 4.2

International aspect is shown by publications. The international conferences are indexed in Scopus and WoS databases with [collection of papers](#) of 2020 containing also articles of the lecturer of the Institute of Agricultural Machinery co-authoring with graduate [students](#), and colleagues from the [Faculty](#) of Food [Technology](#), and colleagues from other Latvian [universities](#), and colleagues from Vytautas Magnus [University](#) (Lithuania, Kaunas), J.E.Purkyne University in Usti nad [Labem](#) (Czech Republic). It also contains an [article](#) of professor of the Motor Vehicle Institute co-authoring with colleagues from the National University of Life and Environmental Sciences of Ukraine. There is an active and efficient cooperation with researchers from Ulbroka [Science Centre](#).

With the information obtained in the research process, the lecturers regularly update their study materials. The students' bachelor's theses supervised by these lecturers also clearly show this connection with the latest in the field. For example, two bachelor's theses in 2021 that received an excellent grade (10 points): bachelor's thesis "Development of a Sheep Farm Technological Solution in *Forestland Ltd*", supervised by Professor, whose field of active research is the improvement and

efficient use of animal husbandry equipment and bachelor's thesis "Development of a solar-powered catamaran" supervised by Professor, whose field of active research is the efficient use of alternative fuels and vehicles.

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

Cooperation of academic staff members within the framework of the programme is evaluated positively. LLU Study Vice-rector's [order](#) stipulates a procedure for elaboration of study courses and traineeship programmes. Clause 1.7 of this procedure states "If a study course is delivered by several academic staff members, a single examination/test and final assessment is required." The academic staff members agree, and the head of department (centre)/ director of institute approves the academic staff member who writes the assessment in control sheet." The leading academic staff member of inter-department or inter-institution courses (academic staff from two or more departments (centres, institutions) participate in delivery of courses) based on agreement and harmonising their decision with faculty's dean or deans, if departments (centres, institutes) are from different faculty. Coordination and approval procedure for course and traineeship programmes, stated previously in Clause 4, encourage collaboration of academic staff members.

Student-teacher ratio in this study programme is 12:3.

Annexes

III. Description of the Study Programme - 1. Indicators Describing the Study Programme		
Compliance of the joint study programme with the provisions of the Law on Institutions of Higher Education (table)		
Statistics on the students over the reporting period	LI_5_annex_Student_statistics.pdf	LI_5_pielikums_Studejoso_statistika.pdf
III. Description of the Study Programme - 2. The Content of Studies and Implementation Thereof		
Compliance of the study programme with the State Education Standard	LI_6_annex_Compliance_with_the_state_education_standard.pdf	LI_6_pielikums_Atbiilstiba_valsts_izglit_standartam.pdf
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard (if applicable)		
Compliance of the study programme with the specific regulatory framework applicable to the relevant field (if applicable)		
Mapping of the study courses/ modules for the achievement of the learning outcomes of the study programme	LI_8_annex_Mapping_of_study_courses.xlsx	LI_8_pielikums_Studiju_kursu_kartejums.xlsx
Curriculum of the study programme (for each type and form of the implementation of the study programme)	LI_9_annex_Study_program_plan.pdf	LI_9_pielikums_Studiju_programmas_plans.pdf
Descriptions of the study courses/ modules	LI_10_annex_Descriptions_of_study_courses.zip	LI_10_pielikums_Studiju_kursu_apraksti.zip
Description of the Study Direction - Other mandatory attachments		
Sample of the diploma to be issued for the acquisition of the study programme.	LI-Diploma.pdf	LI-Diploms.pdf
Description of the Study Programme - Other mandatory attachments		
Document confirming that the higher education institution/ college will provide the students with the options to continue the acquisition of education in another study programme or at another higher education institution/ college (a contract with another accredited higher education institution/ college), in case the implementation of the study programme is discontinued	Agreement_LLU and RTU_Mehanika_EN.docx	Vienosanas_LLU un RTU_Mehanika.edoc
Document confirming that the higher education institution/ college guarantees to the students a compensation for losses if the study programme is not accredited or the licence of the study programme is revoked due to the actions of the higher education institution/ college (actions or failure to act) and the student does not wish to continue the studies in another study programme	LLU_Confirmation_Mehanika_EN.docx	LLU_apliecinajums_Mehanikas_virzienam.edoc
Confirmation of the higher education institution/ college that the teaching staff members to be involved in the implementation of the study programme have at least B2-level knowledge of a related foreign language according to European language levels (see the levels under www.europass.lv), if the study programme or any part thereof is to be implemented in a foreign language.		
If the study programmes in the study direction subject to the assessment are doctoral study programmes, a confirmation that at least five teaching staff members with doctoral degree are among the academic staff of a doctoral study programme, at least three of which are experts approved by the Latvian Science Council in the respective field or sub-field of science, in which the study programme has intended to award a scientific degree.		
If academic study programmes are implemented within the study direction, a document confirming that the academic staff of the academic study programme complies with the provisions set out in Section 55, Paragraph one, Clause three of the Law on Institutions of Higher Education	LLU_Confirmation_Mehanika_EN_change.docx	LLU_apliecinajums_Mehanikas_virzienam_precizets.edoc
Sample (or samples) of the study agreement	LI-Study_Agreement.pdf	LI-Studiju_ligums.pdf
If academic study programmes for less than 250 full-time students are implemented within the study direction, the opinion of the Council for Higher Education shall be attached in compliance with Section 55, Paragraph two of the Law on Institutions of Higher Education.	CoHE_Conclusion_Bc_progr_Agricultural-Engineering-250_EN.pdf	AIP_Atzinums_Bc_progr_Lauks_inz-zin_250.pdf

Machine Design and Manufacturing (42521)

Study field	<i>Mechanics and Metal Processing, Heat Power Engineering, Heat Technology, and Mechanical Engineering</i>
ProcedureStudyProgram.Name	<i>Machine Design and Manufacturing</i>
Education classification code	<i>42521</i>
Type of the study programme	<i>Professional bachelor study programme</i>
Name of the study programme director	<i>Daina</i>
Surname of the study programme director	<i>Kanaška</i>
E-mail of the study programme director	<i>daina.kanaska@llu.lv</i>
Title of the study programme director	<i>Docente, Dr.sc.ing.</i>
Phone of the study programme director	<i>26483712</i>
Goal of the study programme	<p><i>To supply metal processing, machine manufacturing, design, agricultural, transport and trade enterprises, the operation of which is related to design, production, technical service, development, sales and repair of equipment, devices and machines, with qualified specialists through implementation of practically adaptable professional studies.</i></p> <p><i>To train competent engineers in compliance with the economic needs of the country who know agricultural production and product processing technologies, are able to solve topical modern machine manufacturing and metal processing issues, develop innovative products and introduce the innovations, are able to work successfully in engineering technical and management posts related to machine manufacturing.</i></p> <p><i>To promote balanced development of rural regions training comprehensively educated young people- specialists in machine manufacturing and metal processing meeting the carrier requirements in engineering work, people of high level culture, patriots of their profession, region and country.</i></p>

<p>Tasks of the study programme</p>	<p><i>To ensure professional - engineering training of competitive specialists in compliance with the fifth level Professional qualification and the Latvia Profession standard PS0307 in accordance with the present and perspective requirements in the field of machine manufacturing/metal processing.</i></p> <p><i>To develop and strengthen self-education and self-development skills - the basis for the process of further education lifelong.</i></p> <p><i>To develop skills to solve problems, formulate strategical and tactical aims and motivated activities for reaching them.</i></p> <p><i>To develop and strengthen professional skills in engineering - technical creative work.</i></p> <p><i>To ensure compliance of organization of studies with the Latvian legislation and Satversme of Latvia University of Life Sciences and Technologies, as well as compliance of the studies with the existing internal normative Latvia University of Life Sciences and Technologies.</i></p> <p><i>To form understanding of the historical development of machine manufacturing/metal processing in Latvia, the present situation, perspectives, economics of the branch and entrepreneurship, machine design and manufacturing.</i></p> <p><i>To develop active, communicable, creative personalities with a wide world outlook, patriots of their profession, region and country.</i></p> <p><i>To ensure opportunities for preparation of the students for further education in the Master and Doctoral study programs in the Master and Doctoral program of Agricultural Engineering with specialization in Machine Design and Manufacture.</i></p>
<p>Results of the study programme</p>	<p><i>Knowledge and understanding in design of machines and equipment, constructive and technological calculations, automated design systems, machine manufacturing and metal processing technologies, materials, quality system, technological equipment and operation principles, organization and management of the production process and entrepreneurship.</i></p> <p><i>Skills to apply the acquired knowledge in machine design: are able to prepare technological documentation; perform machine, mechanism, unit, part strength calculations; to use the normative acts, technical documentation and standards in the field of mechanics for implementation of the tasks; calculate and design with computer programs; apply the progressive creative methods for creation of new products and development of the existing ones. Are able to perform economic analysis of the production process and products, develop technologies for part production and machine service, to develop control technologies, use the statements of the quality management system.</i></p> <p><i>Competences to solve issues on machine, mechanism, unit construction and production technologies, can collect and use rationally information, develop innovative products, solve problem situations, communicate with colleagues and clients, work creatively, be ready for professional and intellectual development, can take responsibility.</i></p>
<p>Final examination upon the completion of the study programme</p>	<p><i>Bachelor thesis.</i></p>

Study programme forms

Full time studies - 4 years - latvian

Study type and form	<i>Full time studies</i>
Duration in full years	4
Duration in month	0
Language	<i>latvian</i>
Amount (CP)	160
Admission requirements (in English)	<i>General secondary education or vocational secondary education</i>
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	<i>Professional Bachelor Degree in Machine Design and Manufacturing</i>
Qualification to be obtained (in english)	<i>Mechanical Engineer</i>

Places of implementation

Place name	City	Address
Latvia University of Life Sciences and Technologies	JELGAVA	LIELĀ IELA 2, JELGAVA, LV-3001

Part time extramural studies - 5 years - latvian

Study type and form	<i>Part time extramural studies</i>
Duration in full years	5
Duration in month	0
Language	<i>latvian</i>
Amount (CP)	160
Admission requirements (in English)	<i>General secondary education or vocational secondary education</i>
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	<i>Professional Bachelor Degree in Machine Design and Manufacturing</i>
Qualification to be obtained (in english)	<i>Mechanical Engineer</i>

Places of implementation

Place name	City	Address
Latvia University of Life Sciences and Technologies	JELGAVA	LIELĀ IELA 2, JELGAVA, LV-3001

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

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

According to the Cabinet of Ministers [Regulation](#) No. 512 of 26 August 2014, "Regulations on the state standard of second level professional higher education" and in order to alleviate the study load, the traineeships were reduced to 26-20 credits.

Removed from the plan: Theory of Economy 1.5; Intellectual Property and Patents 1.5 credits; Metal Processing Traineeship 3 credits.

New courses added: Technology in Machine Building - course project, 2 credits; Design of Mechanical Engineering Factory, 2 credits.

Courses with total volume of 1.5 credits have been supplemented to achieve 2 credits, and those with 2.5 credits were aligned up to 3 or down to 2 credits.

Credits were reduced for Mathematics and Physics by aligning the volume of these courses to the volume of related programmes in order to improve the planning of flows.

1.2. Analysis and assessment of the statistical data on the students of the respective study programme, the dynamics of the number of the students, and the factors affecting the changes to the number of the students. The analysis shall be broken down in the different study forms, types, and languages.

Number of full-time students has varied from 66 to 76, and number of part-time students has ranged from 23 to 27 annually. Number of alumni in the reporting period was 13 to 19 persons, data are summarised in annex MP_5.

When analysing the reasons why there are less alumni than the persons admitted, one must note expelling due to poor learning achievements, inability to plan their time efficiently. The largest dropout is observed in the 1st study year. Due to scarce offer and size of the scholarships, many full-time and budget students work in parallel to studies and eventually they cannot manage the workload.

Another important aspect is low competition among school leavers, therefore young students with poor achievements in mathematics are admitted and they cannot handle this course already in the first semester.

1.3. Analysis and assessment of the interrelation between the name of the study programme, the degree or professional qualification to be acquired or the degree and

professional qualification to be acquired, the aims, objectives, learning outcomes, and the admission requirements.

Title of the study programme *Machine Design and Manufacturing* has a logical connection to the content of the profession to be acquired and obligations for the alumni in the industry, as well as competence expected by employers.

The goal of the programme implementation is to prepare qualified specialists through practically applicable professional studies to be able to work for the companies operating in the field of metal processing, mechanical engineering, designing, agricultural, transport, trade and which are related to designing, manufacturing, technical servicing, improvement, sales and repair of devices and equipment.

To prepare competent engineers who have good knowledge of agricultural production and production processing technologies according to the needs of national economy, who can solve current challenges in modern mechanical engineering and metal processing industry, develop innovative products and introduce innovations, can successfully work in engineering and leading positions related to the mechanical engineering.

To promote balanced development of rural regions by preparing comprehensively educated youth – specialists who qualify of engineering and mechanical engineering career requirements, persons with well-developed culture, patriots of their profession and the State.

Tasks:

- To prepare professional engineers according to the fifth level professional qualification and the standard of mechanical engineer*, competitive in the labour market and specialists in line with current and perspective demands of the mechanical engineering/metal processing industry in our State. To develop and enhance professional skills in engineering creativity.

** The compliance of the study program with the professional standard has been compared with the project of the professional standard “Mechanical Engineer” (from 08.02.2021). See the document “Mechanical engineer profession standard PROJECT” (MP_1_3_pielikums_Meh_inz_profesijas_standarts_PROJEKTS.pdf) (only in Latvian) in the section “Other Annexes”. The project “Mechanical Engineer” was developed instead of the expired “Professional standard Mechanical Engineer registration number PS 0307, approved by the Ministry of Education (No. 288, April 22, 2005)”. The development process under the leadership of the Latvian Mechanical Engineering and Metalworking Association (MASOC) has started in the spring of 2019 and is still ongoing, and is currently being discussed by industry experts.*

- To develop and enhance self-education and self-development skills and competences – the basis for continued lifelong education.

- To develop problem-solving skills, ability to define strategic and tactic goals and drive self-motivation in achieving said goals.

- To develop active, communicative, creative personality with wide mental outlook, a patriot of their profession, county and State.

The first task is implemented through subjects developing general competence for solving technological, engineering and technical challenges in fields of biosystems machinery and technologies, creating innovative products and technologies. Learning outcomes related to the second task include community development, management psychology and management skills.

Learning outcomes related to the third task shapes an understanding and skills for starting their own business in professional industry.

Degree to be conferred - Professional Bachelor Degree in Machine Design and Manufacturing and the **qualification** of Mechanical Engineer. It will show to the employers the graduate's learning outcomes in the machine science. It matches to the goal to provide extensive knowledge about equipment, devices and machines, designing, manufacturing, installation and repair. The tasks are aimed at achieving the goal through three various domains: company development, engineering and creative approach to all activities.

Knowledge applied to entire study programme is very extensive. Students will have an understanding of professional and creative approach to manufacturing technologies, elaboration of project documentation as well as interaction of mechanical, electromechanical, electronic and computer elements.

Admission terms serve to ascertain the potential student has logical mind-set, further developed by mathematics, and also good communication skills to acquire the courses, and Latvian at the requested level. There are no other particular requirements, because many courses imply basic knowledge, too. Mandatory requirement for admission to the program is the assessment of the centralized examination in Latvian, foreign language and mathematics. An additional assessment is given by the centralized exam in physics, as mathematics and physics are the basic disciplines of engineering.

The compliance of the study program with the state education standard is summarized in annex MP_6, but the study program plans for each type of study program implementation see in annex MP_9.

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

2.1. Assessment of the relevance of the content of the study course/ module and the compliance with the needs of the relevant industry and labour market and with the trends in science. Provide information on how and whether the content of the study course/ module is updated in line with the development trends of the relevant industry, labour market, and science. In case of master's and doctoral study programmes, specify and provide the justification as to whether the degrees are awarded in view of the developments and findings in the field of science or artistic creation.

Knowledge elements in relation to requirements of [Industry 4](#) concept, which applies to autonomous robots, simulations, 3D printing technologies are integrated in the course content.

Within the framework of ESF project [Improvement of LLU Management](#) (only in Latvian) a sub-project Services of Industry Experts for Evaluation of the Content of Study Programmes and Providing Recommendations was implemented in 2019 and 2020. Programme's expertise was run by LTD Temeso by involving 10 experts of various fields who have graduated the programme in different times. Main conclusions of the expertise was: study programme, in fact, is relevant for the industry; the programme is comprehensive, courses to be acquired introduce students to basic

exact fundamental knowledge and also humanitarian and social knowledge; a very positive indication is that students are taught from three different angles which are nevertheless fundamentally important – metal processing technology, mechanics and automation and it matches the industry representatives' demand for employees with a general understanding of wide range of issues, i.e. starting from mechanics and machine elements to electronics, electrical engineering and automation; all in all, the content (plan) of the programme essentially covers all the necessary knowledge so that the student could successfully start working in relevant industry and position.

Of course, the expertise also provided recommendations and proposals for improvement of the programme. Industry and foreign experts provided recommendations on improvement of the programme and courses within the framework of project *Improvement of LLU management* (only in Latvian) and they are summarised in annex 2_part_1_annex; the most important here are: including of the section on painting technologies in the study course "Metal Processing"; including of the section on "Basics of 3D Modelling" in the study course "Technology in Machine Building"; including of the section dedicated to the systems LEAN, TOC, 5S in the study course "Quality Management". These recommendations are integrated into mentioned above courses.

On the basis of these suggestions, the plan for improving the study programme until 2023 was discussed when industry representatives met with student representatives and directors of TF institutes.

See the compliance of the qualification obtained in the study program with the professional standard in annex MP_7; the descriptions of the study courses of the study program are specified in annex MP_10.

2.2. Assessment of the interrelation between the information included in the study courses/ modules, the intended learning outcomes, the set aims and other indicators, the relation between the aims of the study course/ module and the aims and intended outcomes of the study programme. In case of a doctoral study programme, provide a description of the main research roadmaps and the impact of the study programme on research and other education levels.

The aim of the study program Machine Design and Manufacturing is to provide metalworking, mechanical engineering, design, agricultural, transport, trade companies whose activities are related to the design, manufacture, maintenance, improvement, sale and repair of equipment, devices, machines with qualified specialists in the field of machine design and production, working in metalworking, mechanical engineering, design, agriculture, food industry, trade and other economic enterprises, whose activities are related to the design, production, installation, monitoring, assembly, development of mechatronic equipment, devices, machines for various biosystems, sales and repairs. He leads a joint working group of mechanics, electricians, electronics and computer specialists for the design of mechatronics systems, participates in design, production, research, technical supervision, product development, sales and repair processes, ensures compliance with safety and environmental protection laws and regulations. The plan of the study program can be seen in the appendix MP_9. The aim of each study course is to direct the study process towards the total results to be achieved in the study program. The results of the study courses form the overall results of the program. These are summarized in the mapping (in Annex MP_8). On the basis of the [information](#) available on the website of National Coordination Point, Latvian Qualification Framework link with European Qualification Framework there are

several ways to structure and describe the learning outcomes. Discussions among national experts involved in EQF elaboration led to an agreement to use differences between knowledge, skills and competences (KSC) as the basis of the framework, because this is the most popular approach to dividing learning outcomes into categories. Differentiation of learning outcome KSC allows to clearly define the final requirements and to easier classify the qualification levels. However, these three categories (KSC) must be perceived as a uniform set, which may not be divided into parts. Therefore, in order to understand description of one level, one needs a "horizontal reading". The categories may have some similarities (for example, column "competence" includes certain skills, and column "skills" also contains few forms of knowledge), and it is natural.

Knowledge, skills and competences in courses are interrelated and as a cluster they build knowledge, skills and competences in the study programme. It is because not only knowledge generates knowledge, but also competences can promote acquiring of knowledge.

In the mapping of course results one can track a link between programme's outcomes and individual course outcomes. Course achievements cover the attainable results put forth in the study programme.

Course results will facilitate consecutive acquisition of courses according to the schedule by semesters. Each previous semester allows acquiring study courses with the necessary prerequisite knowledge.

Separate goals of the courses guide the student to achieve the common goal.

For example, in the study course "Practice of Production Engineering Service", the knowledge is "to know the technical parameters, construction and equipment of CNC machine tools", which provide the knowledge defined in the Program "to know the technological equipment and materials of mechanical engineering on metalworking". The skill "able to select and justify the conformity of production machines to production conditions and production volume" defined in the study course is promoted by the skill "finished technical documentation" defined in the Program, but the competence of the study course "able to choose and justify the conformity of production machinery to production conditions and production volume" is in accordance with the demand of Program competence "to be creative in work tasks".

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

LLU approach to student training focuses on the student as a personality who develops their abilities and talent. In addition to the clearly defined requirements and assessment criteria described below, a student has an opportunity of supplementing, variegating and specialising the envisaged knowledge depending on individual preferences to deepen their knowledge in a desirable direction, often in multidisciplinary area.

Basic principles, organising of studies, study process, general assessment principles are stated in the Regulation of Studies (<https://www.llu.lv/en/study-guide-documents>).

Study process consists of contact lessons and independent studies requiring a certain amount of work to be done by the student subject to assessment. E-studies system is used in the study process. Study results are evaluated individually. Information about conditions and assessment criteria of acquisition of each course is included in the course programmes available on LLU website.

LLU has its quality management system aimed at excellence. Since 2016, LLU holds Investor in [Excellence certificate](#) and constantly contributes to quality assurance and development according to the Quality Management System's description and delivery [plan](#).

When choosing study implementation methods for study courses, the following is taken into account:

- the aim of the study program, tasks, expected study results;
- the aim and study results set for a specific study course;
- the specifics of the content of the study course to be acquired, as well as the topic (theme);
- student's study opportunities, diverse needs;
- study environment: available study base, informative base, material and technical base;
- teacher's own possibilities in managing the study process.

When implementing student-centred education, according to the circumstances, the teaching staff uses a diverse range of study implementation methods: traditional methods - lectures, practical work, seminars; methods that promote analytical, critical, systemic and creative thinking, develop communication skills - group work, discussions, debates, presentations, situation analysis and modelling, problem solving, study tours, business games, etc.; methods of promoting independent and research work performed by students individually or in groups - reports, essays, homework, study research, final project research, development of term papers; meeting with inviting experts - industry professionals.

Assessment of study results is an integral part of the study process, the aim of which is to evaluate the study results of students, which have been achieved as a result of individual study tasks, part of the study course or the studies of the whole course, and to determine the qualitative assessment of certain study results. It is the provision of feedback, which allows to assess not only the development of students' knowledge and skills, but also the quality of the study process in general.

When implementing student-centered education, the evaluation system in the study program is based on the following principles:

- compulsory assessment - the need to obtain a positive assessment in each study course;
- the amount of completed credit points shall be added to the amount of credit points already obtained by the student only if a successful assessment has been received for the study course, practice, term paper, bachelor's thesis;
- accumulation principle - regular work during the semester influences the final assessment in the study course;
- openness and clarity of requirements - when starting studies, the student is informed about the content of the study course, requirements and assessment criteria and procedures;
- the principle of summing up positive performances - the study course is mastered successfully only if all the requirements specified in the study course program have been fulfilled and the study results formulated therein have been achieved;
- the principle of diversity of the types of tests used in the assessment - different are used types of testing;
- differentiated assessment based on the achievement of study results - study course the assessment system set out in the programs provides the student with an opportunity to

assess the extent to which the student has achieved the expected study results of the study course;

- the principle of assessment review possibilities - “LLU Study Regulations” prescribe the procedure for reviewing the obtained assessment.

The study program is implemented in full-time and part-time forms, but the methods of program implementation and evaluation are unified. For part-time students according to the LLU Regulations of Studies and study plan, which is implemented in 5 years with 4 weeks sessions twice a year, the difference is that the number of contact hours per 1 CP is 50% of the number of full-time contact hours per 1 CP. Part of the practical work and lecture material in part-time studies is acquired independently, based on study and methodological materials in e-studies.

In the context of the Bologna Process, student-centred learning is defined as an outcome-based approach implemented through an effective support and guidance structure with a clearer focus on learner curriculum development, flexible and tailor-made learning pathways that ensure the quality of learning. The courses included in study program Machine Design and Manufacturing describe the study results in detail, and to achieve them an individual approach is used, for example, choosing a topic for independent work, the student can choose the type of device he wants to develop, often company. The internship place is also chosen based on the student's interests in the company's specialization as well as location. The availability of study materials in e-studies provides students with the opportunity to freely plan their time for independent work in all study courses of the program.

LLU is increasingly implementing elements of a student-centred approach that allows and encourages students to be actively involved in shaping their learning experience. For example, the teaching staff of the Latvia University of Agriculture, identifying shortcomings in the knowledge acquired during secondary school, provides an opportunity to acquire this knowledge through initial tasks. In turn, well-prepared students have the opportunity to choose to solve a more complex problem.

Student-centred education is a concept in which a student is seen as a unique person, ensuring the student's active involvement in shaping the learning path. The learning environment, which is focused on student learning, is one in which the LLU lecturer promotes student learning.

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

Latvia University of Agriculture (henceforth – LLU) delivers the traineeship in compliance with the Cabinet [Regulation](#) No. 512 of 26 August 2014 “Regulation on the national second level professional higher education standard” and internal LLU regulatory documents – Traineeship Regulation (See Annex).

Every traineeship has a course description (available on LLU IS, the lecturer in charge hands out descriptions to students either in hard copy or soft copies via e-mail. Students get acquainted with the traineeship assignments in the beginning of the traineeship. Students may choose the place of traineeship individually or with the help from programme’s administration. A trilateral contract is

signed with the traineeship company. The contract stipulates parties' rights and obligations concerning delivery of the traineeship programme. Traineeship supervisor from LLU consults and helps solving problems. Students prepare traineeship report and submit it to the traineeship supervisor and defend it according to the traineeship instructions. Traineeship assignments and assessment criteria correspond to student's competence in completing assignments in this field of study. Traineeship methodology guidelines are elaborated for students, leading employees of the Institute and traineeship supervisor in the company.

The traineeship takes place outside LLU (*a list of traineeship companies is provided in **annex 2_part_11***), industrial companies and it contains:

1. **Technological traineeship in factory**, 4 weeks, 4 semesters. Technological traineeship in factory allows students to learn about technical parameters, structure, equipment, tools, operation of CNC controls of CNC machines in mechanical engineering or metal processing company. They also learn about products to be manufactured, technological processes CNC controls and ensuring dimensional accuracy. Accordingly, students know the technical parameters, structure and equipment of CNC machines, technical parameters and structure of powered tools, essential tools and their application range; they are able to choose and substantiate the compliance of factory's powered tools with the production conditions and production output.
2. **Engineering service traineeship in factory**, 6 weeks, 6 semesters.

During the traineeship Engineering service in factory, students learn practical skills for carrying out technical calculations, designing of machine units and details, technical elaboration, preparation for production and planning works. Students acquire knowledge in personnel management, technical supervision of powered tools, quality management of products, occupational safety and environmental protection, economic assessment of production, cost analysis and profit prognosis.

Consequently, they have knowledge of personnel management, supervision of CNC machines, product quality management, occupational safety and environmental protection.

They know the technical parameters and structure of powered tools, essential tools and their application range; they are able to choose and substantiate the compliance of factory's powered tools with the production conditions and production output.

3. **Factory Engineer Traineeship**, 10 weeks, 7 semesters or 8 and 9 – for part-time students. During the traineeship the students get acquainted with the production technologies, technological systems, methods to ensure processing accuracy, principles of choosing the templates, margin allowance calculations, technological process design in the company; they choose a topic and prepare materials for the Bachelor's thesis. Consequently, the students learn to perform the work of technical engineer and designer, obtain information about the management structure and preparation of production process.

Acquires skills: can elaborate technology for manufacturing the spare parts, designing of spare parts and mechanisms, development of assembling technology, can do the economic calculations of production process.

When the student has completed factory traineeship, he or she is able to analyse technological processes, analyse designer's documentation, choose assembly techniques for mechanisms, improve production process in the company and perform technically economic calculations.

2.5. Analysis and assessment of the topics of the final theses of the students, their

relevance in the respective field, including the labour market, and the evaluations of the final theses.

The Bachelor's thesis is elaborated in Semester 8 and Semester 10 for full-time and part-time students respectively, according to methodological [regulations](#) (only in Latvian). The regulations contain information on the aspects of choice for the topic of the bachelor's thesis, supervision, the general structure, and scope of the thesis, including the size of the graphics part, as well as the design of the work (with samples), review, defense and deadlines for all project development stages. Finally, samples of the application, title page, review page and confirmation (about the originality of the work) are attached to the document. Topic of the Bachelor thesis must be relevant. Relevance is identified in context of key tasks in economy, level of existing knowledge and traineeship requirements. Students choose their Bachelor theses according to the direction of study and traineeship, interests, groundwork in studies and experience. The most useful approach is to continue solving one of the problems faced by the traineeship company in their Bachelor's thesis.

Topic of the Bachelor's thesis is associated with elaboration of new technologies, designing of technological processes in companies or their units, designing of new machines or improvement of existing ones, Recommendations and groundwork described in the thesis must be economically justified, correspond to the environmental protection and occupational safety requirements.

A student chooses the topic of Bachelor's thesis according to the specific requirements stated in the profession standard of Mechanical Engineer, on the basis of materials obtained in the traineeship and needs of the traineeship company, for example: "Automated pin welding device", "Universal roll forming equipment", "Equipment for cutting flexible pipes at SIA DINEX LATVIA". Methodological Commission of the Faculty of Engineering supports also choosing topics for Bachelor's thesis that match the interests of students as long as they meet the requirements of the Regulation, for example: "Raspberry harvester", "Development of strawberry planting device", "Corn sowing machine", "Auxiliary device for floorball training", "Drive mechanism for children carousel". Some topics have been related to interests of farms and processing companies, for example: "Device for identifying insects in grains". The National Examinations Commission (VPK) consists of the leading industry specialists, and its chairman from the beginning of the programme until year of 2020 was the chairman of the Association of Mechanical Engineering and Metal Processing Manufacturing ([MASOC](#)) council.

VPK have stated in its opinions that the results are evaluated as very good. Topics of the theses are relevant, quality of elaboration corresponds the methodological regulations for qualification papers in the professional higher education Bachelor's study programme "Machine Design and Manufacturing" and knowledge, competences and skills defined for the engineer profession (LR profession catalogue code 214515). The average grade in the reporting period was 7.57.

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

In a survey organised in the social media last autumn we found out that 61 new specialists graduated from the programme during the last five years; requests show that 100% of them work

in the field of machine design / metal processing. They are satisfied with chosen profession in the labour market. The respondents gave positive feedback about field excursions during the studies and availability of factory traineeship in the programme. Majority of them had traineeship companies as their first place of work. Favourable psychological climate in the faculty is accepted. The new specialists who participated in the survey recommend increasing the number of practical classes. Taking into account the positive development [dynamics](#) of mechanical engineering / metal processing industry and increase in number of employees students' chances to get work are expected to be good also in perspective.

The main conclusions drawn and also identified from the annual student surveys.

Survey questionnaires contain questions about: students' motivation to study and attitude towards studies; academic staff members' qualification and study management; structure of programme's courses, course content and logical link; evaluation methods applied to assess student achievements and usefulness and necessity for individual courses in mastering the profession and other aspects. In the questionnaire intended to improve the quality of professional Bachelor's study programme and deliver it and to resolve shortcomings in faculty's work, one can provide proposals in a free form.

The students provide positive feedback about the professional Bachelor's study programme "Machine Design and Manufacturing" as well as organisational and methodological measures for its delivery. It is supported by the analysis of survey results:

- 90% of students recognise introduction of democracy principle in faculty's management and 84% also do not see any problems in communication between administrative, academic staff of the faculty and students;
- The academic staff members are evaluated as follows: professionalism in speciality was noted by (85%), in methods (70%), in communication (90%);
- Students confirm that course overlapping is not necessary (90%) and that courses are distributed across seminars logically (80%);
- As the most interesting and appealing courses highlighted by students - Computer-aided designing (45% of respondents), Mechatronics (60%), Machine Elements (40%) and other courses of the speciality's profile;
- Number and scope of elective courses seems satisfactory for 80% of students, and 90% of students appreciate knowledge assessment system in the faculty;
- Percentage of lectures, laboratory work and practical classes is generally acceptable for 70% of students, and 15% would like to increase the share of practical and laboratory work.

Extensive examination of opinions of the employers and their representatives regarding the qualification of programme's alumni, as well as programme's content was done within the framework of [project](#) No.8.2.3.0/18/A/009 "Industry expert services for evaluation of study programme and provision of recommendations".

It was concluded that the programme is sufficiently general to provide possibilities for students to work in mechanical engineering/metal processing industry; generally, programme's content (plan) covers all the basic knowledge so that the student can start working successfully. Recommendations by industry employers and experts are collected in Annex 2.1; they are evaluated and integrated in programmes of relevant courses.

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

the study courses acquired during the mobility.

Students of programme “Machine Design and Manufacturing” participate in Erasmus programme: in 2020, three students studied in International Hellenic [University](#) – Alexander Campus and one student in Czech Republic - Technical University of [Ostrova](#), in 2019 one student participated in exchange programme in Greece, in Alexander Technological Educational Institute of [Tessaloniki](#). See annex 2_part_9.

Before signing the Erasmus contract, student and programme director jointly prepare a letter of intent where the LLU schedule is aligned with the courses offered by Erasmus partnering university for the semester in question. The letter is not signed if the content and scope of such courses fail to meet the requirements. This approach ensures that persons enter in realistic Erasmus contract and alleviate realigning after return. In case of unexpected changes in the courses offered by Erasmus university, the students contact programme director and make amendments to the study agreement. So far, all Erasmus courses have been successfully recognised.

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

3.1. Assessment of the compliance of the resources and provision (study provision, scientific support (if applicable), informative provision (including libraries), material and technical provision, and financial provision) with the conditions for the implementation of the study programme and the learning outcomes to be achieved by providing the respective examples. Whilst carrying out the assessment, it is possible to refer to the information provided for in the criteria set forth in Part II, Chapter 3, sub-paragraphs 3.1 to 3.3.

The programme “Machine Design and Manufacturing” is mainly delivered in the Faculty of Engineering. The classrooms have visualisation devices, laboratories are equipped with the necessary devices, gauges, workbenches, simulators, powered tools, computers according to the technical and technological needs of the study programme. The detailed materially technical provision available for students in the study direction and programme is summarised in Section 3.2 Description of Study Direction of Part II and also in its Annex II-3.1-1.

A welding laboratory with two MIG-MAG devices (400A and 230A) and TIG device 200A was set up in 2020. Metal processing laboratory has devices like CNC milling machine or vertical machining centre with automatic 4-axes indexation; CNC lathe with C axis; universal lathe; laboratory for material science has a muffle furnace; Rockwell hardness measuring device by LEEB with external impact mechanism; mobile surface roughness measuring device; measurement laboratory equipped with tools measuring geometric parameters; a set of laboratory equipment for mechatronics; two 3D printers Zortax M200 and MakerBot 2X. The following licensed special software is available: Matlab, Simulink, AutoCAD, SolidWorks, MasterCam, etc.

Since the study programme involves traineeship, students have an opportunity to learn the

operation of technical and technological equipment in their traineeship company, such as industrial robots and production planning computer software CAPP or dying and coating technologies.

Information on the basic costs of one study place of the study program and costs per student in the period from 2013 to 2021 is given in Section 3.1 Description of Study Direction of Part II.

The detailed information on the methodological and informative provision is given in Section 3.3 Description of Study Direction of Part II.

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

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

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

Teaching staff play an important role in creating high-quality benefits for students and promoting the acquisition of their knowledge, skills and competences.

The structure and scientific qualification of the teaching staff has not changed significantly, see the comparison in the table below and in Annex 2_part_3.

Provision of the study program “Machine Design and Manufacturing” with teaching staff

Position	Quantity		Scientific degree			
	2015	2020	Dr.sc.ing, oec., phyl., math.		Mg.sc.ing.	
			2015	2020	2015	2020
Professor	8	4	8	4		
Prof. Emer.		2		2		
Assoc. prof.	6	5	6	5		
University lecturer	8	9	8	9		
Lecturer	4	5			4	5
Visiting lecturer	4	4			4	4
Total	30	29	22	20	8	9
%			73%	69%	27%	31 %

Changes in the number of teaching staff in the reporting period were influenced by redistribution of the teaching workload within structural units.

The composition and number of teaching staff is appropriate and sufficient for the implementation of the study program in high quality.

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

LLU academic staff members are elected in compliance with LLU Regulation on academic positions. Election for a suitable academic position confirms correspondence of person's academic and professional qualifications both for study and research work. The Regulation was elaborated on the basis of the Law On Higher Education Institutions, Law On Scientific Activity, Education Law, LLU Constitution, Labour Law and other laws and regulations. In context of this Regulation, there are following LLU positions: professor, associated professor, university lecturer, leading researcher, lecturer, researcher, assistant and scientific assistant. Number of positions of professors, assistant professors and university lecturers in relevant science sub-branches is aligned with the financial possibilities and needs of the program delivery, as decided by the Senate in line with the LLU Development Strategy. The number of lecturer and assistant positions is determined according to the study programmes delivered by the faculty and number of students, financial possibilities at the initiative of dean and they are approved by the rector at the proposal of study vice-rector. Persons are elected in the academic position in open competition for six years.

Visiting lecturers are elected for one year, candidates are discussed and voted for in the faculty Council. The mentioned system allows involving properly qualified staff in delivery of studies and programme and attaining of learning outcomes.

Involved in the implementation of the study program “Machine Design and Manufacturing” description of the scientific qualification of the teaching staff

Position	Quantity	Scientific degree	
		Dr.Sc.	Mg.Sc.
Profesors	4	4	
Prof. Emer.	2	2	
Asoc. prof.	5	5	
University lecturer	9	9	
Lecturer	5		5
Visiting lecturer	4		4
Total	29	20	9
%		69 %	31 %

The high level of training of the academic staff is also evidenced by the scientific qualification, as all teaching staff involved in the study process have a doctor's or master's degree (see table above).

The proportion of academic staff is: 79% - elected, 14% - visiting lecturers, 7% - emeritus. The staff with a doctoral scientific degree is 69%, with a master's degree - 31%.

During the reporting period, the share of doctors involved in the implementation of the study program has slightly decreased - by 4%. These changes were determined by the retirement of the teaching staff and redistribution of the study load within the structural unit.

LLU and TF provide a supportive environment that allows staff to perform their work effectively. The following environment:

- provides opportunities and encourages lecturers to improve their professionalism: LLU Study Center annually organizes LLU Academic Conference and textbook and study material competition; LLU has developed and operates a teacher motivation system; LLU Language Center offers language improvement courses for teaching staff; LLU International Cooperation Center provides ERASMUS+ teacher mobility opportunities;
- promotes innovations in the methods of study implementation and the use of new technologies: at least once every six years the teaching staff attends the professional development program of higher education teachers "Innovations in the didactics of higher education institutions" (in the amount of 160 hours); LLU e-learning methodologist offers opportunities to regularly improve knowledge about the possibilities and current events of using the e-learning environment;
- promotes research activities that ensure professional development.

The teaching staff involved in the implementation of the study program regularly increases their qualification also outside the Latvia University of Life Sciences, that is:

- attending in-service training events, seminars and courses organized by various organizations;
- taking part in the ERASMUS+ program at LLU partner universities;
- acting on the boards and commissions of various institutions and companies.

The data of the conducted surveys show that in the reporting period the knowledge of the teaching staff with the assessment "excellent" was assessed by an average of 28% of students, with the assessment "good" - on average 62%, with the assessment "satisfactory" - on average 14% of students. The qualification of the teaching staff is also highly valued by the graduates of the study program. On average, 45% of respondents fully agreed with the statement "In general, lecturers are highly qualified, erudite and knowledgeable in their field".

Scientific qualification of the teaching staff, their regular participation in various councils, organizations, in-service training activities, research activities ensure the conditions necessary for the implementation of the study program "Machines design and Manufacturing".

4.3. Information on the number of the scientific publications of the academic staff members, involved in the implementation of the doctoral study programme, as published during the reporting period by listing the most significant publications published in Scopus or WoS CC indexed journals. As for the social sciences, humanitarian sciences, and the science of art, the scientific publications published in ERIH+ indexed journals may be additionally specified (if applicable).

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

4.5. Provide examples of the involvement of the academic staff in the scientific research and/or artistic creation activities both at national and at international level (in the fields related to the content of the study programme), as well as the use of the obtained information in the study process.

LLU Faculty of Engineering regularly organises international scientific [conference](#) Engineering for Rural Development. The key focus in the conference is aimed at new technologies and scientific research in agriculture, energetics, engineering, engineering education, transportation and similar fields, and also other relevant engineering problems. This gives a possibility to transfer technology from scientists to companies and engage in information exchange with the specialists from your field of research from different European countries. Collection of conference papers is indexed in Scopus and WoS databases.

72% of academic staff members involved in the programme are leading researchers and researchers, LLU has elaborated the Regulation on approval of evaluation procedure of scientific activity efficiency of LLU academic staff, leading researchers, researchers and scientific assistants, which promotes academic staff's motivation to engage in the scientific activity at national and international scale. Collection of conference papers is indexed in Scopus and WoS databases. The scientific publications of the teaching staff involved in the program are summarized in annex 2_part_6.

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

In order to approve the courses in LLU system, the course plan is discussed in the sitting of relevant Institute and also Council of relevant faculty. Course approval is subject to harmonisation by the Programme director. This multi-level course harmonisation system also promotes regular cooperation of academic staff members. Cooperation is also fostered by regular meeting in the scientific conferences, institute sittings and faculty Council. Regarding the quality of study materials and methods, LLU system delivers Professional Development [programme](#) for higher education teachers "Innovations in University Didactics", 160 hours in total. It is mandatory for each academically elected staff member every six years. New and innovative teaching methods are

acquired in this course, education documents are explained, and participants engage in extensive discussions and experience exchange.

On 01.03.2021, the number of students in the programme is 95 persons and academic teaching staff is 29 persons, student-teacher ratio in the programme is 3.3 students per 1 teacher.

Annexes

III. Description of the Study Programme - 1. Indicators Describing the Study Programme		
Compliance of the joint study programme with the provisions of the Law on Institutions of Higher Education (table)		
Statistics on the students over the reporting period	MP_5_annex_Student_statistics.pdf	MP_5_pielikums_Studejoso_statistika.pdf
III. Description of the Study Programme - 2. The Content of Studies and Implementation Thereof		
Compliance of the study programme with the State Education Standard	MP_6_annex_Compliance_with_the_state_education_standard.pdf	MP_6_pielikums_Atbalstiba_valsts_izglit_standartam.pdf
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard (if applicable)	MP_7_annex_Compliance_with_the_professional_standard.pdf	MP_7_pielikums_Atbalstiba_profesijas_standartam.pdf
Compliance of the study programme with the specific regulatory framework applicable to the relevant field (if applicable)		
Mapping of the study courses/ modules for the achievement of the learning outcomes of the study programme	MP_8_annex_Mapping_of_study_courses.xlsx	MP_8_pielikums_Studiju_kursu_kartejums.xlsx
Curriculum of the study programme (for each type and form of the implementation of the study programme)	MP_9_annex_Study_program_plan.pdf	MP_9_pielikums_Studiju_programmas_plans.pdf
Descriptions of the study courses/ modules	MP_10_annex_Descriptions_of_study_courses.zip	MP_10_pielikums_Studiju_kursu_apraksti.zip
Description of the Study Direction - Other mandatory attachments		
Sample of the diploma to be issued for the acquisition of the study programme.	MP-Diploma.pdf	MP-Diploms.pdf
Description of the Study Programme - Other mandatory attachments		
Document confirming that the higher education institution/ college will provide the students with the options to continue the acquisition of education in another study programme or at another higher education institution/ college (a contract with another accredited higher education institution/ college), in case the implementation of the study programme is discontinued	Agreement_LLU and RTU_Mehanika_EN.docx	Vienosanas_LLU un RTU_Mehanika.edoc
Document confirming that the higher education institution/ college guarantees to the students a compensation for losses if the study programme is not accredited or the licence of the study programme is revoked due to the actions of the higher education institution/ college (actions or failure to act) and the student does not wish to continue the studies in another study programme	LLU_Confirmation_Mehanika_EN.docx	LLU_aplicinajums_Mehanikas_virzienam.edoc
Confirmation of the higher education institution/ college that the teaching staff members to be involved in the implementation of the study programme have at least B2-level knowledge of a related foreign language according to European language levels (see the levels under www.europass.lv), if the study programme or any part thereof is to be implemented in a foreign language.		
If the study programmes in the study direction subject to the assessment are doctoral study programmes, a confirmation that at least five teaching staff members with doctoral degree are among the academic staff of a doctoral study programme, at least three of which are experts approved by the Latvian Science Council in the respective field or sub-field of science, in which the study programme has intended to award a scientific degree.		
If academic study programmes are implemented within the study direction, a document confirming that the academic staff of the academic study programme complies with the provisions set out in Section 55, Paragraph one, Clause three of the Law on Institutions of Higher Education		
Sample (or samples) of the study agreement	MP-Study_Agreement.pdf	MP-Studiju_ligums.pdf
If academic study programmes for less than 250 full-time students are implemented within the study direction, the opinion of the Council for Higher Education shall be attached in compliance with Section 55, Paragraph two of the Law on Institutions of Higher Education.		

Agricultural Engineering (51525)

Study field	<i>Mechanics and Metal Processing, Heat Power Engineering, Heat Technology, and Mechanical Engineering</i>
ProcedureStudyProgram.Name	<i>Agricultural Engineering</i>
Education classification code	<i>51525</i>
Type of the study programme	<i>Doctoral study programme</i>
Name of the study programme director	<i>Gints</i>
Surname of the study programme director	<i>Birzietis</i>
E-mail of the study programme director	<i>gints.birzietis@llu.lv</i>
Title of the study programme director	<i>Profesors, Dr.sc.ing.</i>
Phone of the study programme director	<i>28618372</i>
Goal of the study programme	<i>The aim of Doctoral studies is to promote the development of agricultural engineering and build a new generation of internationally highly qualified scientists in agricultural engineering area, as well as to ensure the continuity of academic and scientific personnel at the Faculty of Engineering.</i>
Tasks of the study programme	<ul style="list-style-type: none"> <i>• to ensure a high-quality doctoral study process to prepare qualified scientists, lecturers and engineers who are competitive in the Latvian and European Union labor market and who could meet the current and promising needs of the Latvian and world economy using the latest technologies and solutions in agricultural engineering, product processing , energy supply and its rational use, as well as engineering issues in rural areas;</i> <i>• to promote the development of a creative, responsible and motivated personality for lifelong learning;</i> <i>• develop problem-solving skills, the ability to set strategic and tactical goals and explain actions to achieve those goals;</i> <i>• to develop innovation and creativity as important skills required for an engineer and manager working in the field of agricultural engineering;</i> <i>• to ensure the study process that complies with the Latvian state norms and regulations, the LLU Constitution, as well as the LLU internal norms, which in turn determine the general structure of the study process;</i> <i>• to develop a strategic vision and understanding of engineering sciences in matters related to agriculture in Latvia.</i>

Results of the study programme	<p><i>Knowledge: know and understand topical scientific theories and knowledge in the field of agricultural engineering, scientific language/terminology and databases related to the research field; systematically understand the problems and regularities of selected research field; know the current theoretical and empirical research methodology within the selected study direction.</i></p> <p><i>Skills: able to assess and choose independently appropriate research methodology; able to do theoretical and empirical investigations responsibly in cooperation with adviser and other persons involved in the investigation; able to improve scientific competence participating in projects, reporting in scientific conferences, discussing in seminars and work groups; able to develop/create new knowledge and understanding on existing knowledge and their practical usage implementing important and genuine investigation results, part of which is on the level of internationally indexed publications; able to assess responsibly the field of investigation and its results in the context of interdisciplinary research and sustainable development; able to supervise the research or development tasks within enterprises, institutions and organizations; communicate on the field of investigation with scientists, experts and society in general.</i></p> <p><i>Competence: able to independently put forward innovative research ideas, analyze, synthesize and evaluate them critically in the field of agricultural engineering and interdisciplinary research context; able to carry out important scientific investigations and implement innovations responsibly, independently and critically in the field of agricultural engineering, publishing the research results both in Latvia and internationally recognized and indexed journals; able to independently plan and manage scientific projects, including international; able to supervise scientific theses and participate in education of young scientists; able to promote the sustainable development of agricultural engineering field in both academic and professional context.</i></p>
Final examination upon the completion of the study programme	<i>PhD thesis.</i>

Study programme forms

Full time studies - 3 years - latvian

Study type and form	<i>Full time studies</i>
Duration in full years	<i>3</i>
Duration in month	<i>0</i>
Language	<i>latvian</i>
Amount (CP)	<i>120</i>
Admission requirements (in English)	<i>Master's degree in agricultural engineering, transport, energy, mechanical engineering and related sciences</i>
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	<i>Doctoral degree Doctor of Science (Ph.D.) in Environmental Engineering and Energetics</i>
Qualification to be obtained (in english)	<i>-</i>

Places of implementation

Place name	City	Address
Latvia University of Life Sciences and Technologies	JELGAVA	LIELĀ IEĻA 2, JELGAVA, LV-3001

Full time studies - 3 years - english

Study type and form	<i>Full time studies</i>
Duration in full years	3
Duration in month	0
Language	<i>english</i>
Amount (CP)	120
Admission requirements (in English)	<i>Master's degree in agricultural engineering, transport, energy, mechanical engineering and related sciences. At least B2 level of English language skills</i>
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	<i>Doctoral degree Doctor of Science (Ph.D.) in Environmental Engineering and Energetics</i>
Qualification to be obtained (in english)	-

Places of implementation

Place name	City	Address
Latvia University of Life Sciences and Technologies	JELGAVA	LIELĀ IEĻA 2, JELGAVA, LV-3001

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

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

Changes were not made

1.2. Analysis and assessment of the statistical data on the students of the respective study programme, the dynamics of the number of the students, and the factors affecting the changes to the number of the students. The analysis shall be broken down in the different study forms, types, and languages.

11 full-time doctoral students in total study in the program in academic year of 2020/2021 (see annex DR_5). It was decreased by 10 doctoral students from the academic year 2014/2015 to 2020/2021. The decrease in the number of doctoral students in the program can be largely explained by falling number of graduates from the Bachelor and Master study programs' in Agricultural Engineering. Starting from 2020/2021 there is a slight increase in the number of doctoral students in the program. During the reporting period, first 2 foreign doctoral students, with English as instruction language, study in the program. No doctoral students have been admitted to part-time studies over last 8 years.

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

Graduates of postgraduate [study](#) (only in Latvian) programme Agricultural Engineering are conferred a Doctoral Degree of Engineering Sciences thus achieving the goal of postgraduate studies – to promote development of agricultural engineering and create highly qualified new scientists of international level in sub-field of agricultural engineering as well as to ensure renewal of the composition of academic staff members of the Faculty of Engineering.

Having acquired the study programme and after defense of the doctoral thesis, a doctoral student knows and understands the most topical scientific theories and conclusions of agricultural engineering, scientific terminology and is familiar with databases related to direction of study, understands problems and regularities in research systemically, is aware of relevant theoretical and empirical research methodology in the selected research direction.

A person who have acquired the doctoral degree is able to independently evaluate and choose a methodology that is suitable for the scientific research; they can independently conduct theoretical and empirical research in cooperation with their supervisor and other persons involved in the studies; they are able to develop scientific qualification by participating in research projects, reading papers in conferences, partaking in discussions of seminars and work groups; they are able to create new knowledge and understanding in the chosen field of research, conducting original research at considerable volume, where part of it is elaborated at the level of internationally quotable publications; they are able to responsibly evaluate the research and its results in interdisciplinary and sustainability context; they are able to manage research and development-related tasks in companies, institutions and organisations, communicate about their area of scientific activity with industry specialists, wider scientific circles and society in general.

The graduate is able to independently come up with innovative research ideas, analyse them critically, synthesize and evaluate agricultural engineering fields in multidisciplinary context; they are able to conduct significant scientific research in agricultural engineering responsibility, critically, analytically and with evaluation perspective and publish research results in Latvia and abroad in internationally recognised and quoted publications; they are able to plan and head scientific projects independently, including international projects; they are able to supervise scientific work and join a team of teachers who prepare the new scientists; they are able to promote sustainable development of engineering field both in academic and professional setting.

Persons who have Master's Degree in agriculture machinery, transport, energy, machine construction and related qualifications are entitled to participate in a [competition](#) (only in Latvian) for postgraduate studies in LLU Faculty of Engineering, sub-field of agricultural engineering. Once admitted, the applicants who have obtained the Master's degree in other scientific discipline, may be asked to pass an entry exam in the chosen scientific field where indicated so by the programme director of the relevant doctoral study programme and department / institute.

The main evaluation criterion of entry exam is the level of the applicant's knowledge in the main theoretical issues of the chosen specialty.

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

2.1. Assessment of the relevance of the content of the study course/ module and the compliance with the needs of the relevant industry and labour market and with the trends in science. Provide information on how and whether the content of the study course/ module is updated in line with the development trends of the relevant industry, labour market, and science. In case of master's and doctoral study programmes, specify and provide the justification as to whether the degrees are awarded in view of the developments and findings in the field of science or artistic creation.

A Scientific Degree of Doctor of Engineering Sciences to be conferred after graduation from the doctoral programme Agricultural Engineering is based on the latest achievements and conclusions of agricultural engineering sub-field. It is ensured by the qualification and active research of national and international level by the academic staff involved in the study programme and also

attracting of foreign reviewers for reviewing the doctoral theses. Every 6 years the professors involved in the study programme / academic staff members who participate in the competition to a position must prove their qualification, academic and research activity over recent years thus reassuring their activity according to the recent achievements and conclusions of the industry.

The content of individual study courses of the doctoral study program is updated in accordance with the needs and current trends of the industry and the labor market, taking into account the information and recommendations provided by industry experts in regular meetings and seminars organized by the Faculty of Engineering and by the industry.

Detailed evaluation of the content of study courses was performed in 2019 and 2020 within the framework of the ESF project "Improvement of LLU management" subproject "Services of industry experts for evaluation of study program content and provision of recommendations", which involved 10 industry experts from different fields and who assessed the content of the study program as appropriate for the industry and also covering all the necessary knowledge for the industry.

The proposals made within the project for the further improvement of the program were discussed jointly during the meeting of the director of the study program with the representatives of the field, students and the management of the faculty in August 2020.

In the doctoral study program in Agricultural Engineering, the degree is awarded by the Promotion Council in the field of Environmental Engineering and Energy Sciences, which includes 10 LZP experts. In accordance with Cabinet Regulation No. 101 "Procedure and Criteria for Awarding a Doctoral Degree", a degree is awarded for an independently developed and publicly defended doctoral thesis under the guidance of an experienced scientist (supervisor), which contains original scientific research results and provides new findings into the relevant scientific field or sub-sector. The Promotion Council evaluates the submitted works in accordance with the existing legal requirements, incl. in terms of originality and topicality in the respective field of science. All works submitted during the reporting period to the Doctoral Council of Environmental Engineering and Energy Sciences have been successfully defended.

2.2. Assessment of the interrelation between the information included in the study courses/ modules, the intended learning outcomes, the set aims and other indicators, the relation between the aims of the study course/ module and the aims and intended outcomes of the study programme. In case of a doctoral study programme, provide a description of the main research roadmaps and the impact of the study programme on research and other education levels.

Results in the study programme (see annex DR_9) are attained gradually over the full-time study cycle.

The aims, results and content of the study courses (see Annex DR_10) ensure the achievement of the aim the results of study program.

Detailed information is provided in the mapping of course results (see Annex DR_8) where one can track a link between individual course outcomes and programme's outcomes.

Doctoral study programme Agricultural Engineering has four study directions: agricultural energetics; agricultural machinery; transport; machine construction and design. The main research

directions of the doctoral study programme Agricultural Engineering concurs to the priority research directions of the Faculty of Engineering which are included also in LLU Development [Strategy](#) 2015-2022 (only in Latvian). These directions are use of sustainable energy in motor vehicles; smart technologies and robot-aided biosystems; sourcing and use of renewable energy; reduction and rational use of production by-products and waste.

The goal of using a sustainable energy in motor vehicles is to evaluate prospects of using sustainable fuels alternative to fossil fuels in motor vehicles operated in Latvia, as well as to elaborate solutions for more efficient use of these fuels.

The goal of research of smart technologies and robot biosystems is to evaluate possibilities to introduce smart systems and agricultural robots in Latvia and to develop suitable technologies and technical equipment towards achieving that goal.

The goal of sourcing and use of the renewable energy is to research and create practical solutions for sourcing and use the energy (heat, electrical, mechanical) from renewable resources available in Latvia: biomass, sun, wind and others, ensuring economically sound technologies with economic applicability

The goal of research on reduction and rational use of by-products and waste is to reduce non-usable waste created in various manufacturing processes and to examine possibilities of utilisation. Main emphasis in the research is put on the use of agricultural (partly wood-pulp) products and improvement of processing (storage, drying modes, new technologies, use of solar energy) and evaluating possibilities to utilize waste (used oils, food products, ash etc.). This body of research is closely linked to theoretical study on thermal mass transfer in various materials and process modelling.

Implemented lines of research in postgraduate studies largely dictate the scope of topics elaborated on in the Bachelor and Master theses, given that many supervisors of doctoral theses supervise also the Master and Bachelor theses.

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

The main principles of doctoral studies are stipulated in LLU Doctoral Studies [Regulation](#) (only in Latvian). Doctoral study programme Agricultural Engineering can be acquired as full-time studies for state's funding and also as full-time and part-time studies if financed by natural or legal persons. During studies the doctoral student acquires theoretical courses, passes doctoral exams, performs scientific work, presents research results in scientific conferences, publishes them in internationally acknowledged and quotable scientific publications (*incl. LLU scientific [journal Rural Sustainability Research](#)*). At the end of studies students elaborate and submit their doctoral thesis and summary for defense.

Acquisition of the study program is realized in lectures, seminars, practical classes, independent work and consultations with course teachers and supervisors of doctoral thesis. Study delivery methods used for study courses have been chosen to ensure achievement of programme's goals.

The study results are formulated in the descriptions of study courses of the study program, and in the study process the study methods are chosen that ensure the best possible achievement of these results, taking into account the individual needs of doctoral students.

Given the specifics of the programme and number of students in the doctoral study programme, one can follow a truly individual approach to doctoral students and take into account their study circumstances and diversity of their needs, for example, by linking the content of the study course to the topic of doctoral thesis or the relevant field of science. Doctoral studies encourage ultimate independence of students, at the same time providing guidance and support from the academic staff members, scientific supervisor or study programme's director. This approach promotes mutual respect in relationships between doctoral student and scientific supervisor and ensures the implementation of the principles of student-centered education in the study process.

Students of the doctoral study programme Agricultural Engineering, pursuant to Clause 10 of Doctoral Study [Regulation](#) (only in Latvian), are entitled to submit applications and complaints about delivery of study process, violations of study and work procedures and receive answer from the official in the given term.

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

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

Prospective doctoral student chooses a topic of doctoral thesis before the admission to postgraduate studies. Before documents are submitted, the applicant makes an agreement with potential doctoral thesis' supervisor about supervision of the doctoral thesis and its topic. When submitting the documents for admission to doctoral studies, the applicant must submit an application where he or she indicates a supervisor, topic and substantiation of doctoral thesis and practical application, relevance of the topic (compliance with priority research directions stated in LLU [Strategy](#)), research goal and tasks, methodology as well as research experience and scientific groundwork. The Science Council decides in the sitting if the applicant is admitted to the doctoral studies and then a potential doctoral student introduces council members to the research he or she had applied.

The topics of doctoral theses are usually chosen to continue the research of Master thesis or in relation to field of work of the doctoral student, and also in line with priority directions of research listed in LLU [Strategy](#), such as "Improvement of vertical-axle wind rotor with active adjustment of blade angle", "Possibilities to reduce harmful bioethanol combustion emissions in spark ignited

motors”, “Research on electrical vehicle operation parameters.” “Solutions for improving electric vehicle charging system performance”, “Modelling and control of power supply to mobile agricultural robots”, “Use of hydrogenated vegetable oils in diesel engines”, “Mobile robot path planning in unknown environment.”, “Studies of robotic manipulators for biological object processing”, etc.

A doctoral thesis elaborated at the end of postgraduate studies must be defended in LLU Environmental Engineering and Energetics Doctoral Council (only in Latvian). Once the doctoral thesis has been successfully defended, the doctoral student is conferred a degree of Doctor of Science (PhD) of the Republic of Latvia, which is evidenced by a diploma issued by the doctoral council. Decision on conferring the degree or refusal thereof is made by the council with a simple majority of votes in an open voting. All the theses submitted to the doctoral council have been defended successfully.

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

A feedback from doctoral students is received in two ways. Doctoral students can express their opinions about the programme’s courses they attended, academic staff members and courses in general biannually in LLU Information System. When harmonising progress reports of individual work plan of a doctoral student, the programme director can hear out an assessment of individual doctoral student and opinion on certain courses and programme in general, twice a year.

Graduates of the doctoral study program in agricultural engineering are generally positively evaluate and approve the quality of the study program and the competencies acquired during the studies. However, several suggestions have also been made for the improvement of the study process, such as:

- to increase the scholarship or to ensure the permanent involvement of doctoral students in academic work or research projects related to the topic of the doctoral thesis, so that the doctoral student does not have to look for additional earning opportunities outside the university;
- if possible, to ensure the acquisition of study courses using the e-study system;
- within the framework of the study program to provide opportunities to attend various training courses in the university or outside it for the acquisition of specific knowledge for the development of his/her doctoral thesis.

The director of study program reviews and discusses the expressed proposals together with the heads of the related institutes/departments and the faculty, and as far as possible makes improvements and changes in the study program.

Taking into account the mentioned proposals, the content of several study courses and their acquisition in the e-study system has been improved. Currently, three research and science support (internal grant) programs are available at LLU:

1) LLU program “Implementation of LLU Research program”, which aims to ensure implementation of research directions approved in LLU Strategy, to promote fulfillment of performance indicators and to promote the involvement of master's, doctoral students and young researchers in scientific activities;

2) LLU program "Strengthening of scientific capacity at LLU", the aim of which is to promote the development of priority research directions specified in the LLU science development strategy and the development of appropriate doctoral theses;

3) LLU program "Performing fundamental research at LLU", the aim of which is to ensure the performance of fundamental research at LLU, thus creating new knowledge and technological insights in the research directions specified in the LLU Strategy.

Within the framework of ESF [project](#) (only in Latvian) "Development of Latvia University of Life Sciences and Technologies Management" industry experts were attracted to evaluate the study programmes. Main conclusions of experts: study programme is fundamentally relevant for the industry; programme's content (plan) covers basically all the necessary knowledge for a student to successfully conduct the scientific work.

Experts of the industry also came up with their proposals for improvement of programme's content.

1. To consider organisation of studies and workload of supervisors to keep supervisor's interest in working with their doctoral students. Many persons who have a doctoral degree emphasize the huge importance of a supervisor who was interested in their work;
2. To recommend topics of doctoral theses in the industry which are related to student's professional activities or, if the doctoral student works at the university as the primary workplace, to engage them in project work so that the doctoral thesis involves cooperation with other professionals from the field sparking interest in the new doctoral student, to an extent possible.
3. Experience of other countries shows that the best practice is to continue the research started in graduate studies later in the postgraduate studies. That way, the process becomes more complicated in terms of study organisation, because one must build a basis of knowledge already in the graduate studies, and on the other hand the doctoral studies should progress more rapidly;
4. In general, to seek to create so-called industrial doctoral studies. To an extent possible, to look for opportunities how the university can cooperate with the large companies in order to make projects implemented together with the industry. Perhaps for some structural units it requires to join an association of the industry so that the scientists are informed about specific projects announced, as well as to meet entrepreneurs or so-called networking;
5. Supervisors should pay a special attention to developing scientific mind-set in the new doctoral students. That is to say, scientific methods in work, critical evaluation of own work, methods of data sourcing and processing, their validation etc.
6. To introduce a system where scientifically technical seminars take place within the framework of a structural unit, where scientists or industry representatives read their papers, and each doctoral student must present their progress one or two times per semester. It is intended rather for brainstorming and work progress with thesis than examining a doctoral student or making a report;
7. To consider a possibility for a doctoral student to teach project-related skills. Ways to attract financing, where to look for projects, how to make project applications. Financing is very decisive in quality of outcome and work progress.

According to recommendations of the doctoral students and industry representatives, director of the study programme makes necessary adjustments or improvements of the study programme.

Since large part of postgraduate graduates becomes academic staff members of the Faculty of Engineering, they directly and indirectly become those who deliver and improve the programme.

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

ERASMUS+ KA1 [programme](#), which is implemented via LLU International Cooperation Centre, offers mobility opportunities for doctoral students.

A list of courses to be acquired while in mobility programme, before leaving for partnering university, is harmonised with study programme's director and after returning – based on the documents issued by the partnering university; all courses are fully aligned.

In the frame of ERASMUS + KA1 program, LLU has concluded agreements with 10 partner universities that provide student mobility in doctoral study level in the field of engineering, however, during the reporting period none of the doctoral students has used the offered mobility opportunities. This is mainly due to the fact that doctoral students are employed in one of the companies during the study period, thus the opportunities to go on mobility for several weeks or months are minimal. At the same time, doctoral students actively use opportunities to go outside Latvia to report and discuss at international conferences on their research results.

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

3.1. Assessment of the compliance of the resources and provision (study provision, scientific support (if applicable), informative provision (including libraries), material and technical provision, and financial provision) with the conditions for the implementation of the study programme and the learning outcomes to be achieved by providing the respective examples. Whilst carrying out the assessment, it is possible to refer to the information provided for in the criteria set forth in Part II, Chapter 3, sub-paragraphs 3.1 to 3.3.

Doctoral study programme Agricultural Engineering is delivered in the [Faculty](#) of Engineering, which comprises 4 institutes with engineering direction: Institute of Energetics, Institute of Agricultural Machinery, Mechanics Institute and Institute of Motor Vehicles. Materially technical base of all the mentioned institutes (study and scientific research base) is available for postgraduate students. The detailed materially technical provision available for students in the study direction and programme is summarised in Section 3.2 Description of Study Direction of Part II and also in its Annex II-3.1-1.

Doctoral students and academic staff members can enter LLU informative system (henceforth – LLU IS) with their username to view e-book [databases](#) Taylor & Francis Group, CRC Press and EBSCO eBook Academic Collection e-books and e-journal databases EBSCO databases, ScienceDirect journals and Willey Online Journals.

A study course [register](#) has been created where doctoral students can read course descriptions, get information about course acquisition, assessment requirements. The academic staff members extensively use LLU [e-studies](#) in the study process where they place study materials, deliver classes

when necessary and use as a platform for submission of students' works and for activities necessary for a successful acquisition of any course. Every student can follow-up their study progress in LLU IS when logging in their account.

LLU Fundamental [Library](#) provides good opportunities to get textbooks and scientific literature. It is possible to get interlibrary subscription services.

Industry publications for studies and research are available in the Subscription, Textbook subscription, Reading-room, UN Food and Agriculture Organisation repository library. Factual and bibliography references to various agriculture and other industry related issues can be received in the Bibliography Information Department.

Academic staff members are informed about temporary access databases. [Databases](#) containing academic staff publications and doctoral theses have been created. Library employees consult on topical issues and also advise students on search of the scientific information.

The detailed information on the methodological and informative provision is given in Section 3.3 Description of Study Direction of Part II.

Information on the basic costs of one study place of the study program and costs per student in the period from 2013 to 2021 is given in Section 3.1 Description of Study Direction of Part II.

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

The development of high-quality research in the study program is ensured by the research laboratories of the Faculty of Engineering with modern scientific equipment and precise measuring devices: Alternative Fuels Research Laboratory; Grain drying and storage scientific laboratory; Agricultural machine mechanics scientific laboratory; Dairy production technique and technology scientific laboratory; Biogas Scientific Laboratory, Alternative Energy Laboratory and Biotechnological Process Automation Scientific Laboratory. In recent years, several modern research equipment has been purchased with ERDF funding, including a sustainable biofuel research equipment with an engine stand and mobile emission measuring equipment, a set of field robot operation research equipment, hydraulic material testing equipment and gas analyzers for biogas. Other equipment and tools available at the Faculty of Engineering are also used in the research work. For an overview of the main equipment, see the annex II-3.1-1.

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

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

Academic staff composition has not changed significantly in the reporting period. In total, 20

lecturers are currently involved in the implementation of the program. Of them: 9 (45%) professors, 4 (20%) assoc. professors, 2 (10%) docents, 4 (20%) leading researchers and one guest lecturer. Since 2013/2014 the total number of academic staff involved in the study year has decreased by 3 people. This is due to the reduction in the number of doctoral students, thus the impact on the quality of studies is minimal. 17 (85%) of the participants in the implementation of the program are the leading academic staff of the Technical Faculty.

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

According to LLU Doctoral Study [Regulation](#) (only in Latvian) the doctoral study programme is delivered by highly qualified LLU academic and scientific staff. A doctoral thesis' supervisor can be a Doctor of Science who conducts research in relevant scientific field (sub-field) and who has published peer-reviewed scientific publications about research in this scientific field, and who reads papers in international scientific conferences.

The [Law](#) On Higher Education Institutions states that not less than five persons with doctoral degree out of which at least three are industry experts approved by the Latvian Council of Science must participate in delivery of academic doctoral study programme.

In general, currently all the lecturers involved in the implementation of the program have a doctoral degree. Seven (35%) of them are LZP experts in the field of Environmental Engineering and Energy.

Besides the mentioned academic staff members, a number of other professors and leading researchers deliver lectures in the Faculty of Engineering and conduct active scientific work, and they are involved in delivery of doctoral study programme as soon as the number of doctoral students increase.

The higher the academic staff qualification, the sooner and more comprehensive the learning outcomes are, given that academic staff collaborates more closely with doctoral students and have more individual approach therefore they can convey their knowledge, skills and competences also to doctoral students. Furthermore, the academic staff members must participate in professional development [programme](#) "Innovations in University Didactics" once per election term where the academic staff improve their teaching skills.

4.3. Information on the number of the scientific publications of the academic staff members, involved in the implementation of the doctoral study programme, as published during the reporting period by listing the most significant publications published in Scopus or WoS CC indexed journals. As for the social sciences, humanitarian sciences, and the science of art, the scientific publications published in ERIH+ indexed journals may be additionally specified (if applicable).

The academic staff of the doctoral study program has created 366 scientific publications in total from 2015 to 2020 (see the list of publications in the annex 2_part_6), 300 of them are indexed in Scopus or WoS CC databases (71 of them are publications in journals). The number of publications during this period has fluctuated on average around 60 publications per year, while the number of publications in journals indexed in Scopus or WoS CC databases has increased from 8 publications in 2015 to 16 publications in 2019 (list of most significant publications published in journals indexed in the Scopus or WoS CC databases, see in the annex DR_III_4_3). Since 2015, the academic staff of the doctoral study program has also registered 10 patents.

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).

Academic staff members are engaged in international and national projects of various levels, and also in contractual work both as managers and executors (see the list in annex DR_III_4_4_annex Participation in projects - Updated).

4.5. Provide examples of the involvement of the academic staff in the scientific research and/or artistic creation activities both at national and at international level (in the fields related to the content of the study programme), as well as the use of the obtained information in the study process.

Participation in implementation of the project No. PG105232 “Electro Mobility as driver to support policy instruments for sustainable mobility”/e-mopoli” under international ETS Interreg EUROPE programme 2014-2020 allows learning about general trends and problems of the industry in their way to electrification therefore helping to outline prospective topics of doctoral thesis. 1 professor was involved in this project. The information obtained in the project allowed to improve the content of the study course “Transport specialty” in the Transport direction of study program with the latest transport electrification solutions in passenger and freight transport systems, in that way promoting research in the direction of sustainable transport.

Meanwhile academic staff members from several institutes are involved in implementation of ERAF research project (only in Latvian) “Use of electric power in vehicles of private persons” and ZM ELFLA project (only in Latvian) /topic LAD23 - “Autonomous robotised platform Latvijas iDārzs for a sustainable planting industry development” which acquire new knowledge and experience within the framework of the project, which in its turn are integrated in content of doctoral study programme’s courses and elaborated doctoral theses. The first mentioned project involved a total of 8 people from the teaching staff of the program and the information obtained in the project on electric vehicles and their charging technologies allowed to supplement both the content of study course “Transport Specialty” of transport direction and study course “Agricultural Energetics” of

Energetics direction with the latest technologies in electric drive and charging. In the second project, 3 lecturers of the study program were involved and the information obtained in this project allowed to supplement both transport and energy special study courses with elements of autonomous and robotic technology development in these sectors.

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

The cooperation of teaching staff is promoted through the process of multi-level coordination/ approval of study courses (approval at the meeting of the institute, by the director of the study program, at the meeting of the Faculty Council), in which the relation to other study program courses is assessed!

Calculating by full-time equivalent, the ratio of students to teaching staff in 2020/2021 is 11.0. In terms of the number of people, the ratio of students to teachers is 0.55.

Annexes

III. Description of the Study Programme - 1. Indicators Describing the Study Programme		
Compliance of the joint study programme with the provisions of the Law on Institutions of Higher Education (table)		
Statistics on the students over the reporting period	DR_5_annex_Student_statistics.docx	DR_5_pielikums_Studejoso_statistika.docx
III. Description of the Study Programme - 2. The Content of Studies and Implementation Thereof		
Compliance of the study programme with the State Education Standard		
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard (if applicable)		
Compliance of the study programme with the specific regulatory framework applicable to the relevant field (if applicable)		
Mapping of the study courses/ modules for the achievement of the learning outcomes of the study programme	DR_8_annex_Mapping_of_study_courses.xlsx	DR_8_pielikums_Studiju_kursu_kartejums.xlsx
Curriculum of the study programme (for each type and form of the implementation of the study programme)	DR_9_annex_Study_program_plan.xlsx	DR_9_pielikums_Studiju_programmas_plans.xlsx
Descriptions of the study courses/ modules	DR_10_annex_Descriptions_of_study_courses.zip	DR_10_pielikums_Studiju_kursu_apraksti.zip
Description of the Study Direction - Other mandatory attachments		
Sample of the diploma to be issued for the acquisition of the study programme.	DR-Diploma.pdf	DR-Diploms.pdf
Description of the Study Programme - Other mandatory attachments		
Document confirming that the higher education institution/ college will provide the students with the options to continue the acquisition of education in another study programme or at another higher education institution/ college (a contract with another accredited higher education institution/ college), in case the implementation of the study programme is discontinued	Agreement_LLUNRTU_Mehanika_EN.docx	Vienosanas_LLUNRTU_Mehanika.edoc
Document confirming that the higher education institution/ college guarantees to the students a compensation for losses if the study programme is not accredited or the licence of the study programme is revoked due to the actions of the higher education institution/ college (actions or failure to act) and the student does not wish to continue the studies in another study programme	LLU_Confirmation_Mehanika_EN.docx	LLU_apliecinajums_Mehanikas_virzienam.edoc
Confirmation of the higher education institution/ college that the teaching staff members to be involved in the implementation of the study programme have at least B2-level knowledge of a related foreign language according to European language levels (see the levels under www.europass.lv), if the study programme or any part thereof is to be implemented in a foreign language.	LLU_Confirmation_Mehanika_EN_change.docx	LLU_apliecinajums_Mehanikas_virzienam_precizets.edoc
If the study programmes in the study direction subject to the assessment are doctoral study programmes, a confirmation that at least five teaching staff members with doctoral degree are among the academic staff of a doctoral study programme, at least three of which are experts approved by the Latvian Science Council in the respective field or sub-field of science, in which the study programme has intended to award a scientific degree.	LLU_Confirmation_Mehanika_EN_change.docx	LLU_apliecinajums_Mehanikas_virzienam_precizets.edoc
If academic study programmes are implemented within the study direction, a document confirming that the academic staff of the academic study programme complies with the provisions set out in Section 55, Paragraph one, Clause three of the Law on Institutions of Higher Education	LLU_Confirmation_Mehanika_EN_change.docx	LLU_apliecinajums_Mehanikas_virzienam_precizets.edoc
Sample (or samples) of the study agreement	DR-Study_Agreement.pdf	DR-Studiju_ligums.pdf
If academic study programmes for less than 250 full-time students are implemented within the study direction, the opinion of the Council for Higher Education shall be attached in compliance with Section 55, Paragraph two of the Law on Institutions of Higher Education.	CoHE_Conclusion_Dr_progr_Agricultural-Engineering-250.pdf	AIP_Atzinums_Dr_progr_Lauks_inz-zin_250.pdf

Biosystems machinery and technologies (43525)

Study field	<i>Mechanics and Metal Processing, Heat Power Engineering, Heat Technology, and Mechanical Engineering</i>
ProcedureStudyProgram.Name	<i>Biosystems machinery and technologies</i>
Education classification code	43525
Type of the study programme	<i>Academic bachelor study programme</i>
Name of the study programme director	<i>Imants</i>
Surname of the study programme director	<i>Nulle</i>
E-mail of the study programme director	<i>imants.nulle@llu.lv</i>
Title of the study programme director	<i>Profesors, Dr.sc.ing.</i>
Phone of the study programme director	26453133
Goal of the study programme	<i>To train a qualified, creative, competent specialist in the field of Biosystems Engineering and Technology who will: works in metalworking, mechanical engineering, machine design, agriculture, food industry, trade and other enterprises, which are involved in the design, production, installation, monitoring, assembling, development, marketing and repair of mechatronic equipment, devices, machines for various biosystems. He leads a team of mechanics, electricians, electronics and computer specialists for the design of mechatronics systems, participates in the design, production, research, technical supervision, product development, marketing and repair processes, ensures compliance with safety and environmental laws and regulations.</i>
Tasks of the study programme	<ul style="list-style-type: none"> • <i>Understand and learn the basics of nature and community development, management psychology, and management skills in general education disciplines (Engineering Psychology, Entrepreneurship for engineers, Labour and Civil Protection, Ecology and Environmental Protection, Waste Management);</i> • <i>Acquire the structure and principles of machinery, mechanisms and energy devices, their design and manufacturing process technologies and related engineering tasks with basic engineering disciplines (Engineering Mathematics, Physics for Engineers, Chemistry, Engineering Graphics with AutoCad, Computer Aided Engineering Design with SolidWorks, Electrical Engineering and Electronics, Embedded Programming for Engineers, Metrology and Tolerances, Applied Mechanics, Heat Engineering, Hydraulics and Pneumatics, Mechatronics, Materials and Materials Processing, Manufacturing Engineering and Quality Management);</i> • <i>To be able to use the knowledge gained in specialized courses on the characteristics of biosystems and mechatronics in solving engineering tasks in the fields of energy, agriculture, horticulture, woodworking and food production (Agricultural Technologies and Machinery, Wood Processing Technologies and Machinery, Vehicles Technologies and Mobile Robots, Food Technologies and Equipment, Industrial Automation, Renewable Energy and Energy Economy, Modelling of Dynamic Systems, Introduction in Crop Production, Integrated and Biological Crop Production, Integrated and Biological Horticulture, Introduction in Animal Husbandry, Biological Livestock Husbandry, Design of Microcontroller Systems, Technology in Machine Building).</i>

Results of the study programme

Knowledge

- *Understand the biosystem's approach to manufacturing technologies.*
- *Understands the process and stages of design documentation development.*
- *Able to execute work drawings of parts and assemblies.*
- *Able to calculate strength of components of machines and mechanisms.*
- *Uses computer aided design and computer aided engineering (CAD/CAE) softwares for developing a design.*
- *Can set up a list (BOM – bill of materials) of materials, components, and assemblies as well as the quantities needed to manufacture a certain product.*
- *Have skills in the work of a mechanical engineering technologist.*
- *Apply quality management for product development.*
- *Understands the interaction of mechanical, electromechanical, electronic and computer equipment.*
- *Is familiar with the most frequent refusal of mechatronic systems.*
- *Prepare economic analysis of production processes and products.*
- *Interpret and analyse data collected during testing in order to formulate conclusions, new insights or solutions.*
- *Conduct literature research. Conduct a comprehensive and systematic research of information and publications on a specific topic. Present a comparative evaluative literature summary.*
- *Uses professional terminology.*
- *Can define technical requirements of goods, materials, methods, processes, services, systems, software and functionalities by identifying and responding to the particular needs that are to be satisfied according to customer requirements.*

Skills

- *Able to execute work drawings of parts and assemblies.*
- *Prepare the technical documentation.*
- *Can design constructions, mechanisms, equipment, machines.*
- *Can calculate strength of components of machines and mechanisms.*
- *Uses computer aided manufacturing (CAM) technologies for parts manufacturing.*
- *Develops parts manufacturing technologies.*
- *Improves products, constructions and technologies.*
- *To understand the interaction of mechanical, electromechanical, electronic and computer equipment.*
- *To be able to predict a trouble-free operation of mechanical, electrical, electronic and computer equipment.*
- *Is able to find the causes of damage of the mechanical equipment and eliminate them.*
- *Can work with ready-made programs designed to control mechatronics equipment.*
- *Managing the PLC and being able to program them.*
- *Is able to orient in automatic adjustment technique and its elements.*
- *Able to understand mechanical, pneumatic, hydraulic, electrical and electronic systems and their schemes.*
- *Can use mechatronic systems diagnostic equipment and measuring instruments.*
- *Develop maintenance technologies of mechatronic systems.*
- *Is able to service mechatronic systems.*
- *Can apply labour protection, fire safety and environmental protection requirements.*
- *Understand ISO, EN and other country standards in their field.*
- *Can evaluate and approve engineering design to go over to the actual manufacturing and assembly of the product.*
- *Design prototypes of products or components of products by applying design and engineering principles.*

Competences

- *Can solve problem situations.*
- *Can communicate with colleagues and customers.*
- *Able to work creatively.*
- *Able to establish work priorities, work in a team and plan, organize and manage activities thereof, as well as work individually.*
- *Able to obtain and rationally use information.*
- *Ready to develop professionally and intellectually.*
- *To be able to cooperate with representatives of other professional specializations.*
- *Can take responsibility.*
- *Is able to use advanced work experience and latest technical solutions.*
- *Observe the principles of professional ethics.*

Final examination upon the completion of the study programme	<i>Bachelor Thesis.</i>
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Study programme forms

Full time studies - 3 years - english

Study type and form	<i>Full time studies</i>
Duration in full years	<i>3</i>
Duration in month	<i>0</i>
Language	<i>english</i>
Amount (CP)	<i>120</i>
Admission requirements (in English)	<i>General secondary education or vocational secondary education. At least B2 level of English language skills</i>
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	<i>Bachelor Degree in Mechanical Engineering</i>
Qualification to be obtained (in english)	<i>-</i>

Places of implementation

Place name	City	Address
Latvia University of Life Sciences and Technologies	JELGAVA	LIELĀ IEĻA 2, JELGAVA, LV-3001

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

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

License for programme “Biosystem mashinery and technologies” was received on 25 February 2020 on the basis of the resolution adopted in the sitting of the Study Quality Commission.

There have been no changes in the parameters of the study program since receiving the license.

1.2. Analysis and assessment of the statistical data on the students of the respective study programme, the dynamics of the number of the students, and the factors affecting the changes to the number of the students. The analysis shall be broken down in the different study forms, types, and languages.

Admission of students to the programme has been declared as of the academic year of 2020/2021. There was interest in the opportunity to study, but COVID-19 was affected by the situation and no students were admitted

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

Title of the study programme “Biosystems Machinery and Technologies” is a logical continuation of Agricultural Engineering, a title used previously in Latvia, Europe and worldwide. Since different biological systems operate not only in the agriculture, but also in the food industry, forestry, renewable energy sector and elsewhere, term ‘biosystems’ is being used to include all the biological systems existing in these industries.

The aim the study programme is to train a university graduates of a broad profile for the employment in the field of Biosystems Machinery and Technologies who is able to apply knowledge and abilities, supported by theoretical understanding and critical thinking, to independently identify and manage problems in own professional activity. The aim corresponds with the [mission](#) and vision of the University.

Devices, equipment and machinery used in the agriculture, forestry, food industry and renewable energy sector include complex mechatronic systems. A specialist operating such systems must have extensive knowledge of mechanics, hydraulics, electronics, programming and often, to

achieve the desirable result, one must also understand the biological processes, which take place in such an equipment.

Large manufacturers of devices provide universal solutions for numerous processing and manufacturing measures. This market is relatively saturated, but, as soon as an equipment or machine adapted to the requirements for specific product or manufacturing premises is required, price of ordering such customised device becomes incommensurable. Latvia has several positive examples where company's engineer designs and orders parts for laser-cutting, buys the necessary components and create a product to fit the company's needs. Costs of the end product is several times lower than for the marketed product. The same situation applies to the spare parts of the machinery. Some engineers acquire designing skills in LLU Faculty of Engineering, [programmes](#) (only in Latvian) Machine designing and manufacturing and Agricultural Engineering, with Latvian as instruction language.

Study [programme](#) Biosystems Machinery and Technologies, offered in English, is designed to attract international students. It will bring positive trends for international cooperation in designing field. The latest designing trends are related to the use of cloud services where specialists from different countries collaborate online. Emphasis on the availability for the system and special software from any place and any device. When obtaining the knowledge, skills and competences offered in the programme, the graduate will be able to work in such a team and carry out the most suitable tasks.

Learning outcomes related to the first task include nature and community development, management psychology, and management skills. The second task is realized through the study courses, which form generic competences to solve technological, engineering and technical issues in the fields of Biosystems Machinery and Technologies. The achievement of the learning outcomes of the third task is realized through the study courses, which focus on the application of knowledge and abilities for professional activity in the fields of energy, agriculture, horticulture, woodworking and food production.

Degree to be obtained – Bachelor Degree of Mechanical Engineering; it will show to employers the graduate's study achievements in field of mechanical engineering. It concords to the goal to provide extensive knowledge of mechatronic equipment, devices and machines, designing, manufacturing, installation and repair. A sample diploma can be found in the annex BMT-diploma.

Knowledge applied during entire study programme is very wide. Students will understand the Biosystem's approach to manufacturing technologies, the process and stages of design documentation development, the interaction of mechanical, electromechanical, electronic and computer equipment.

Admission terms are aimed to ascertain that a potential student has logical mind-set, further developed by mathematics, and also good communication skills to acquire the courses, and English at the requested level. There are no other particular requirements, because many courses imply basic knowledge, too.

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

2.1. Assessment of the relevance of the content of the study course/ module and the compliance with the needs of the relevant industry and labour market and with the trends

in science. Provide information on how and whether the content of the study course/module is updated in line with the development trends of the relevant industry, labour market, and science. In case of master's and doctoral study programmes, specify and provide the justification as to whether the degrees are awarded in view of the developments and findings in the field of science or artistic creation.

Biosystems machinery is a branch of the engineering science, bringing together technical sciences and designing and applicable biology, environmental and agricultural sciences. It represents development of the agricultural engineering, linking it to more diverse biological systems, except for biomedicine.

The new study programme will contribute to all three smart specialisation directions of Latvia: change of manufacturing and export structures in traditional economy industries; development in industries where high added value products exists or can be created; and industries with significant horizontal impact and contribution to transformation of the economy. Study programme "Biosystems Machinery and Technologies" corresponds to RIS3 Smart specialisation directions: "Knowledge intensive [bioeconomy](#)", "Smart [materials](#), technologies and engineering systems", as well as "Smart [energy](#)". [Corresponds](#) to: Priority 1 - More efficient use of pre-treatment products to manufacture products with higher added value, creation of new materials and technologies and diversification of application thereof; Priority 3 - Enhancement of energy efficiency which includes creation of new materials, optimisation of manufacturing processes, introduction of technological novelties, use of alternative energy resources and other solutions; Priority 5 - Modern education system conforming to future market demands, promoting economy transformation and development of competences, entrepreneurship capacity and creativity necessary for implementing VSS priorities at all levels of education; Priority 6 - Developed knowledge base (fundamental science and science infrastructure) and human capital in fields of knowledge where Latvia has relative advantages and which are important in economy transformation; Priority 7 - Awareness of existing resources in territories and specialisation, promoting perspective economy development possibilities and directions, incl. leading and prospective business directions in municipal territories.

Newly created prospective programme should be offered also to Latvian youth in the Latvian language. The Ministry of Economy [in their report](#) (p. 67 - only in Latvian) predicts lack of specialists having the higher education in engineering sciences, manufacturing and construction both in 2020 and 2027 at 15%. Jelgava City Development Programme 2014-2020 states that the city focuses on promotion of industrialisation and development of support infrastructure, the city traditionally develops industry and due to availability of qualified labour force Jelgava has been able to attract new industrial companies.

Jelgava City [Development Programme](#) 2014-2020 emphasizes (p. 27 - only in Latvian): *Scientific and research potential of the city is related to Latvia University of Agriculture. (LLU), which could serve as the basis for creating new, innovative products and technologies. LLU scientists conduct research in food technology, **agriculture, energy**, transport, forestry and wood processing, environmental, veterinary medicine and other fields. Results of the scientific research open new development possibilities for entrepreneurs of adjacent territories which were not utilised sufficiently until now.* It is said in p. 29: *Companies in Jelgava basically operate in the following industries: wholesale, retail, vehicle repair (673 companies), professional, scientific and technical services (297 companies), transport and storage (205 companies), construction (201 companies) and processing industry (173 companies).* Also, academic staff members of the programme are involved in R&D projects of Jelgava city in transport and other fields.

In the newly created study programme Biosystems Machinery and Technologies all course programmes were elaborated in 2020 (see annex BMT_10). Their content and volume were structured basing on the experience in other study programmes, courses for Erasmus students, student, academic teaching staff and employers' survey.

Delivery of courses includes professional software used by the alumni in practice: AutoCad, SolidWorks (also Motion and Simulation), MathCad, MatLab, MasterCam, Automation, SCADA, programming in Windows C etc. Even very theoretical courses like mathematics, chemistry and physics are aimed at down-to-earth applicability in product development and designing. Course content includes also Industry 4.0 philosophy and latest trends in manufacturing organisation. Designing and manufacturing training courses are directly aimed at product designing and manufacturing. There are many middle-sized companies in Latvia and worldwide which have grown out of and strengthened their positions in the market by delivering orders from larger companies, also from abroad. However, for further development it is necessary to elaborate and create own product. Here, in addition to the drawing skills, a student also needs to understand how to evaluate strength parameters of components and skills to perform durability simulations. Training requires that the products (parts, assemblies) have technical documentation (drawings, bill of materials - BOM) prepared according to the applicable industry standards and automatic BOM generation options are also used and strength of parts/assemblies according to the promised loads and conformity to the situation is evaluated. If strength parameters allow, amount of the material used for components production is reduced to boost the manufacturing efficiency.

When preparing the professionals, often a deeper training in a narrower field is provided. Specialists form the study programme Biosystems Machinery and Technologies can develop their interdisciplinary skills. In addition to technical knowledge, it is possible to acquire knowledge of biological systems where devices designed by them are intended to work. Besides the conventional field cultivation, cattle breeding and horticulture methods, biological methods which are more environmentally-friendly are viewed. They are gaining popularity in Latvia and globally in certain social circles. Many young people pay attention to healthy lifestyle and sustainable use of natural resources, therefore we believe this type of businesses have development potential.

2.2. Assessment of the interrelation between the information included in the study courses/ modules, the intended learning outcomes, the set aims and other indicators, the relation between the aims of the study course/ module and the aims and intended outcomes of the study programme. In case of a doctoral study programme, provide a description of the main research roadmaps and the impact of the study programme on research and other education levels.

Goal of the study programme Biosystems Engineering and Technologies is to prepare a qualified, creative, competent specialist in field of biosystems machinery and technologies, working in metalworking, automotive, designing, agricultural, food industry, commerce and other industrial businesses where activity is related to designing, manufacturing, installation, monitoring, assembly, improving, sales and repair of mechatronic equipment, devices, machines intended for various biosystems. Is able to manage a work groups of mechanics, electricians, electronics specialists and computer specialists who design mechatronic systems, participate in designing, manufacturing, research, technical supervision, product improvement, sales and repair processes, ensure compliance with the safety techniques and environmental protection laws and regulations. The study program plan is available in appendix BMT_9.

When analysing the proposed goal of the study programme and coherence with the study courses, the wide profile of emerging specialist is outlined. When preparing a specialist with knowledge, skills and competences in designing and manufacturing of mechatronic devices intended for biosystems, one arrives a cluster of results allowing a specialist adapting also to other areas mentioned, such as: sales, repair of such equipment, research and development processes. Goal of each course is to direct the study process to achieve overall results of the study programme. Results of the courses make overall programme outcomes. They are collected in the mapping (see annex BMT_8). The mapping was elaborated on the basis of the [information](#) available in the website of National Coordination Point, Latvian Qualification Framework link with the European Qualification Framework: There are several ways to structure and describe the learning outcomes. Discussions among national experts involved in EQF elaboration led to an agreement to use differences between knowledge, skills and competences (KSC) as the starting point for the framework, because this is the most popular approach to dividing learning outcomes into categories. Differentiation of learning outcome KSC allows to clearly define the final requirements and to easier classify the qualification levels. However, these three categories (KSC) must be perceived as a single cluster, which may not be divided into parts. Therefore, in order to understand description of one level, one needs a 'horizontal reading'. The categories may have some similarities (for example, column 'competence' includes certain skills, and column 'skills' also contains few forms of knowledge), and it is natural.

Course knowledge, skills and competences are interrelated and as a cluster they build knowledge, skills and competences in the study programme Biosystems Engineering and Technologies! That is because not only knowledge generates knowledge, but also competences can promote acquiring of knowledge. In the mapping of course results (see annex BMT_8) one can track a link between programme's outcomes and individual course outcomes.

Course results will facilitate consecutive acquisition of courses according to the schedule by semesters. Each previous semester allows acquiring study courses with the necessary prerequisite knowledge.

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

LLU approach to student training focuses on the student as a personality who develops their abilities and talent. Besides the requirements and assessment criteria described below and clearly defined, a student has an opportunity of supplementing, variegating and specialising the envisaged knowledge depending on individual preferences to deepen their knowledge in a desirable direction, often in multidisciplinary area.

Basic principles, organising of studies, study process, general assessment principles are stated in the Study Regulation of LLU (<https://www.llu.lv/en/study-guide-documents>).

Study process consists of contact lessons and independent studies requiring a certain amount of work to be done by the student and this work is being assessed. E-studies are used in the study process. Study results are evaluated individually. Information about conditions and assessment

criteria of acquisition of each course is included in the course programmes is available on LLU website.

The following principles are followed when acquiring the learning outcomes:

- fair assessment of knowledge and skills – there is a set of requirements for positive assessment of learning outcomes;
- compulsory assessment principle – one needs to acquire positive assessment of compulsory programme's content.

Platforms of programme's assessment are formal test and examination. Students are motivated for timely studies and achievement of better results during the semester through a regular supervision of theory mastering and performance of independent work. Consultations with academic staff members are available both during and outside the class sessions. As the course begins, the academic staff member introduces students with the learning outcomes of the course, acquisition progress and intermediate control, and requirements for receiving the final assessment. Theoretical part is monitored through tests, their count is specified in the course programme, laboratory works are marked as passed once they are completed and protocols are prepared, questions analysed in the practical classes are examined by oral presentation, colloquiums or as written papers. In some courses intermediate tests are taken by the students in e-studies. Study courses end with a formal test or examination, which is often cumulative evaluation of achievements during the semester. If the acquisition of course is planned during several semesters, at the end of each semester one must take a formal test and at the end of full course – an examination.

Students are motivated to complete their assignments regularly in the semester. If running assignments are completed timely and at good quality, they can receive cumulative assessments in the course. Knowledge is obtained gradually and strengthened during the entire semester. It also alleviates the stress of students in examination period.

Studies are delivered according to study year system, and students are transferred to next study year once they acquire previous study plan. Study plans are available in dean's office of the Faculty of Engineering, at programme directors and website.

Analysis of study outcomes. During the first-year studies students adapt to the new study environment. Therefore, a special attention is paid to attendance of courses and progress of individual assignments. The teaching staff abide by the LLU Study Vice-rector Decree No. 02.1-03/26 of 20.03.2012. "On Procedure for Controlling Full-Time Student Attendance". Students whose attendance and progress cause concerns, are invited for negotiations with the programme director. They discuss causes of absence and failed tests and prepare a schedule of further studies. Results of each individual course are discussed between the academic staff members and students, and they analyse them after elaboration of each paper or test. Analysis of overall study results is done in the Methodological Learning Commission of the Faculty of Engineering.

Student makeup and diversity of their needs are taken into account when creating suitable learning paths. Various ways to deliver the programme according to the capabilities are taken into account and used. Multifunctional teaching methods are applied depending on circumstances. Promotes student's efforts for independence, at the same time provides guidance and support from the academic staff. Fosters mutual respect between the student and academic staff member. There are procedures in place for solving students' complaints.

The assessors are aware of the test and examination methods and they receive support for development of their skills in this field. Evaluation criteria and methods and also criteria for giving grades are published in advance. Evaluation gives the students an opportunity to show to what extent they have achieved the expected learning results. Students are given feedback, which

provides advice related to learning process where necessary. If possible, the evaluation is performed by more than one examiner.

Assessment conditions take into consideration different circumstances that alleviate student's situation. Assessment is consistent, fair and suitable for all students and is implemented under approved procedures. There is a procedure in place for viewing the students' appeals.

LLU has its quality management system aimed at excellence. Since 2016, LLU holds Investor in Excellent certificate and constantly contributes to quality assurance and development according to the Quality Management System's description and assurance [plan](#).

In conjunction with the Bologna Process, student-centred learning has been defined as an approach that replaces conventional models of education with an outcome-based perspective implemented through "new approaches to teaching and learning, effective support and guidance structures and a curriculum focused more clearly on the learner leading to high quality, flexible and more individually tailored learning paths".

The study course programs included in the study programme of Biosystems machinery and technologies describe the study results in detail. To achieve them an individual approach is used, for example, designing the equipment chosen by the student or compiling a control program of individual project. An individual approach is also embedded through elective courses, where the student can choose what kind of knowledge base and in which direction to specialize more.

Due to the many benefits associated with an academic environment focused on student learning and achievement, LLU is increasingly implementing elements of a student-centred approach that allows and encourages students to be actively involved in shaping their learning experience.

There are different types of students who need individualized education. Although the student has not been given the necessary basic knowledge in some studies during secondary school, the teaching staff of the LLU, finding shortcomings, gives the opportunity to acquire this knowledge through initial tasks. Also, if the student is well prepared, he has the opportunity to choose more complex problem situations and improve by solving them.

In this respect, student-centred education is a concept that considers the student as a person with a unique background, while also ensuring the student's active involvement in shaping the learning path itself. The learning environment focused on student learning is one in which the LLU lecturer promotes student learning. It must be said that the teaching staff of LLU has always been very accommodating and students have felt an individual approach to issues related to studies, science and students' public life.

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

Traineeship is not envisaged for the study programme *Biosystems Engineering and Technologies*.

2.5. Analysis and assessment of the topics of the final theses of the students, their

relevance in the respective field, including the labour market, and the evaluations of the final theses.

New study programme. Students are not admitted yet.

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

Students, graduates, experts and potential employers express positive opinion about content of the programme Biosystems Engineering and Technologies and planned study courses. Almost all of the surveyed alumni from LLU Faculty of Engineering expressed interest in studying in such modern programme rich in engineering knowledge.

Conclusion by two external experts is positive too: professor from the Agriculture Academy of Vytautas Magnus University in Lithuania and expert from SIA TEMESO. Improvements recommended by them have been implemented fully.

When presenting the new study programme to the dean of the Faculty of Engineering of the Agriculture Academy of Vytautas Magnus University, directors of institutes and programmes, we received a positive feedback about modernity of courses and programme content.

Discussions with the employers about their wishes and situation in the production units led a conclusion that biosystems engineering and technology engineers with technical mindsets are highly demanded. Most preferably they should be practically prepared and excellent in their field. At the same time employers understand that variety of the necessary skills are huge, because fields where such specialist can work, are innumerable. Therefore, it is important to initially acquire the basic knowledge, skills and competences, which is ensured by the study programme.

Recommendations given by the students involved, alumni, experts and employers are outlined below, and steps were taken to improve the situation.

Recommendations to improve. Introduce a study course on common approaches – the biosystems approach. The structure and results of the program in relation to possible optional courses should also be explained. The emphasis should be placed first on Biosystems, then on engineering.

Actions carried out. The general concept of the biosystems approach is presented within the study course Research Methodology in Biosystems Machinery. The introductory part of each specialized course first looks at the specific features of the particular biosystem, but then only the machinery and technologies.

Recommendations to improve. Sustainability of the use of natural resources and development of the current industry is important therefore this aspect should be taken into consideration when designing the study program.

Actions carried out. The program includes a part of the biosystem that emphasizes nature conservation and sustainable use of resources. A particular emphasis is placed on courses Integrated and Biological Crop Production, and Integrated and Biological Horticulture.

Recommendations to improve. Bachelor's thesis can be, as a consolidating element, divided into semesters, allowing to summarize the main conclusions of the study courses, using them, in the development and improvement of a specific biosystem machine and technology.

Actions carried out. This approach is supported, and we will try to implement it already in the second year of studies, allowing students to choose the topic of bachelor's thesis. A plan will be set up in cooperation with the supervisor, it will lead to the successful development of the bachelor's thesis.

Recommendations to improve. The study process requires contact with industry and manufacturers. These may be internships, guest lectures or seminars.

Actions carried out. Due to the limited study time, internships are not organized but study tours to companies and guest lectures and seminars with practitioners are foreseen.

Recommendations to improve. To reduce the number of study courses per semester by increasing their volume.

Actions carried out. Following the expert's recommendations, 10 study courses were merged, moving from 2CP to 4CP, thus reducing the number of study courses and exams per semester.

Recommendations to improve. The internal regulations should stipulate predominant factors, which confirm compliance of the foreign language skills of each academic staff member with the provisions of laws and regulations.

Actions carried out. The Study and Language Centre is instructed to elaborate and approve a procedure for testing the foreign language skills of the academic staff members and defining the necessary level if they work with foreign students. In parallel to all aforesaid, English courses are organised and delivered to LLU academic staff members.

Recommendations to improve. To expand options in the section of Restricted elective courses.

Actions carried out. Section of restricted elective courses has been expanded considerably, giving students an opportunity to choose the most suitable study course.

Recommendations to improve. To supplement the study programme's section of compulsory and restricted electives on biological systems.

Actions carried out. The restricted electives' section has been supplemented with the courses on biological systems as follows: Introduction in Crop Production, Integrated and Biological Crop Production, Introduction in Animal Husbandry, Biologic Livestock Husbandry, Waste Management.

Recommendations to improve. Theoretical courses, such as mathematics, physics, chemistry, must be enriched with practical examples.

Actions carried out. When drawing up the course programme, the academic staff members of theoretical courses have kept their focus on and have included practical issues broadening understanding of, for example, role of mathematics and physics and they prepare a basis for other courses like Strength of Materials and Applied Mechanics. Topics the graduate student might face in their practical experience, for example, corrosion processes, impact of materials and environment, are emphasized in chemistry.

Recommendations to improve. To improve performance of computers in computer classes or distribute resource-intensive software among several computer classes.

Actions carried out. In 2020, one computer class was upgraded in the Faculty of Engineering with new PCs. Computers from this computer class were used for setting up another computer class with

software with less computer resource requirements. Currently the Faculty has 6 computer classes, 15-20 computers in each. One class was set up in 2010 and two in 2013 and 2018, and, as previously said, yet another one was set up in 2020. High performance computers used for designing software. LLU Faculty of Engineering can fully provide students with software versions like AutoCad, AutoCad Mechanical and SolidWorks, and students can install them on their computers and work from home, possibly on even more powerful computers.

Recommendations to improve. To rearrange computer classes so that screen can be seen more comfortably.

Actions carried out. This problem was characteristic to one computer class; we rearranged it so that students can work comfortably in PCs and see the screen.

Recommendations to improve. Computer-aided designing with SolidWorks starts concurrently with study course Applied Mechanics. Applied Mechanics should be acquired before designing, at least the first semester if not the entire course.

Actions carried out. Considering pros and cons, we arrived at a conclusion that it is better to place course Computer Aided Engineering Design with SolidWorks in Semester 4. The Applied Mechanics implies also basics of Theoretical Mechanics and Strength of Materials, therefore SolidWorks is acquired in parallel to them and this software can be used for assessment of mechanism's statistic, kinetic, dynamic and strength parameters. Skills of using SolidWorks software can be used also in implementing course assignments in courses yet to come and also for project of the Bachelor thesis. Computer Aided Engineering Design with SolidWorks involves elaboration of a device/ aggregate / machine project, and it will be based on tools available in the software for motion and strength simulation. Meanwhile in the course Applied Mechanics (in Semester 5) this project will be supplemented with specific calculations of machine elements, for example, in Kisoft software and can be adjusted depending on the results. This project can be also transformed into the Bachelor thesis.

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

New study programme. Students are not admitted yet.

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

3.1. Assessment of the compliance of the resources and provision (study provision, scientific support (if applicable), informative provision (including libraries), material and technical provision, and financial provision) with the conditions for the implementation of the study programme and the learning outcomes to be achieved by providing the respective examples. Whilst carrying out the assessment, it is possible to refer to the information provided for in the criteria set forth in Part II, Chapter 3, sub-paragraphs 3.1

to 3.3.

The new study programme “Biosystems Engineering and Technologies” is LLU profile programme with constituents supervised by the University’s faculties. Both materially technical base and intellectual potential has grown over years to ensure development of relevant study direction and qualitative delivery of programmes within that direction. In this study direction LLU has included programmes like Agricultural Engineering, Machine Designing and Manufacturing and Technical Expert. Materially technical base required for starting the programme has been provided (see annex II-3.1-1). As the programme develops and number of students grow, of course, there will be a possibility to supplement and improve study base, at the same time improve conditions of other mentioned programmes.

Study programme Biosystems Machinery and Technologies, within the framework of SAM project 8.2.1, have methodological teaching aids elaborated in English, and students can access them in LLU e-studies.

All students and academic staff members can enter LLU informative system (henceforth – LLU IS) with their username to view e-book databases Taylor & Francis Group, CRC Press and EBSCO eBook Academic Collection e-books and e-journal databases EBSCO databases, ScienceDirect journals and Willey Online Journals.

In order to make studies easier, a study course register has been created where students can read course descriptions, get information about course acquisition, assessment requirements <https://lais.llu.lv/pls/pub/kursi.startup?l=1>. Academic staff members widely use LLU e-studies system where study materials are placed, tests organised, home assignments submitted etc. in the study process. Each student has their username to track their study process in LLU IS.

LLU Fundamental Library provides good opportunities to get textbooks and scientific literature. One of the main tasks of the library is to gather all information sources from Latvia and from abroad, on machine science, field crop, horticulture, agriculture economy, nature science, agricultural machinery, livestock husbandry, veterinary medicine, food production and nutrition science, housekeeping, wood processing, forestry and other fields. The library has abundant range of nature science, engineering and social science publications. It is possible to get interlibrary subscription services.

Industry publications for studies and research are available in the Subscription, Textbook subscription, Reading-room, UN Food and Agriculture Organisation repository library. Factual and bibliography references to various agriculture and other industry related issues can be received in the Bibliography Information Department.

Academic staff members are informed about temporary access databases. Databases containing academic staff publications and doctoral theses have been created. Library employees consult on topical issues and also advise students on search of the scientific information.

LLU informative and methodological base is detailed, transparent and structured to ensure a quick access for students to studies related information, see course materials and acquisition requirements in e-studies and also LLU Fundamental Library provides students with very wide range of study and scientific literature and access to diverse databases.

Foreign students study in LLU since the academic year of 2015/2016 and LLU has translated numerous documents. There are some regulatory [documents](#) available for public in the English language. Different application forms are available for students in dean’s office of the faculties.

Every year the LLU Senate confirms distribution of revenue and expenditure of LLU combined budget structure, which is prepared in compliance with the law “On the State Budget” annually passed by the Saeima, and annual order of the LLU rector “On Planning of LLU Combined Budget”. The combined budget is controlled and audited by an external sworn auditor, whose opinion and report are reviewed and confirmed by the Senate.

Before the revenue and expenditure of LLU combined budget are approved in the Senate, it is reviewed, discussed and approved by the Action Group for Resource Utilisation and Development, which consists of the rector, vice-rectors, chancellor, Director of LLU, deans of all faculties, head/CFO of the Resource Accounting Centre, head of the Finance Planning Centre, chief economic officers, main specialists in the real estate and legal matters.

Distribution of revenue and expenditure approved in LLU Senate determines that 80% of the assigned state funding comprise remuneration and 20% comprise other costs. 60% of funds from paid studies are spent on covering remuneration costs and 40% – other costs, 20% of which are in direct control of the Faculty delivering the relevant study programme. Volume of funding of the scientific base is calculated and granted annually from the active scientific work. Scientific base funding, amounting to 50%, can be spent by the Faculty, and 50% are intended for covering central costs. Scientific funding comprises the funds attracted for project implementation.

Initially, the Bachelor study programme “Biosystems Machinery and Technologies” intend to enrol 10 students each year. This number of study places allows keeping the studies at good quality. Over time the number of students could reach up to 100. Materially technical and financial basis built during delivery of existing study programmes could manage such number of students.

The financial basis of the programme is planned from the tuition fee revenue, when delivering the Bachelor studies in English to foreign students.

Larger number of students have economic advantages, since it reduces actual expenses per 1 student (at the same time common infrastructure is being used and academic staff remuneration is attributed to each student). It is essential, taking into account that the public funding for higher education is not sufficient.

The planned annual budget for delivery of study programme:

1. *Sources of funding:* Paid studies – 30,000 EUR (10 foreign students x 3,000 EUR yearly study fee)
2. *Division of study programme’s costs:*

Income from paid studies:

- Remuneration for academic staff members, assisting staff etc. (60%)
- Costs of maintenance and study delivery (40%)

Detailed calculation of study programme’s costs:

1. Indicators taken into account for calculating costs for one student annually:
 - **Base costs of one study place per year determined by the government** – in compliance with Article 16 of the Cabinet Regulation No. 994 of 12.12.2006 “Procedure by which higher education institutions and colleges are funded from the state budget” (henceforth – Cabinet Regulation No. 994) and increase of academic remuneration rate in connection with teacher salary reform, in compliance with Cabinet Regulation No. 445 of 05.07.2016 “Regulation on teacher salary” (henceforth – Cabinet Regulation No. 445), base costs of one study place per year amount to 1518.98 EUR;
 - **Study cost ratio** – according to Cabinet Regulation No. 994, Annex 1, the minimum value of

study cost ratio in thematic area of education “Engineering sciences and Technologies” is 1.7;

- **study programme level ratio** – according to Article 13 of Cabinet Regulation No. 994, study level ratio of Bachelor study programmes is 1;
- **state funding for one budget place in related study programme** – state funding in 2019 for one financed budget place at the amount of 99.97517% in Bachelor study programme Agricultural Engineering is 2,745.96 EUR (incl. social security costs of study place is 164.34 EUR). By subtracting social security costs, the financing for one study place per year amounts to **2,581.62 EUR** ($1518.98 \times 1.7 \times 1 \times 0.9997517 = 2581,62$);
- The planned study fee for the new study programme Biosystems Machinery and Technologies in academic year of 2021/2022 is **3,000 EUR**. This tuition fee does not include social security of the study place, because students who pay for studies themselves do not get scholarships.

2. Calculation of the necessary number of students to deliver studies at good quality:

- **Required volume of academic work, expressed in hours, per academic year** – students must acquire 40 credits each study year. The necessary number of contact lessons (lectures, practical / laboratory work, seminars) 1 credit equals 16 h, 40 credits equal 640 h. In addition to contact lessons, the academic staff members plan 160 h for other work related to studies (correction of assignments, examinations, tests etc.). Total planned volume of academic work per year is 800 h ($640 + 160 = 800$);
- **Necessary number of workloads to implement study work in the study year** – LLU with Senate Resolution No. 1 determines the following number of academic hours per year:
 - professor – 900 h
 - associated professor – 920 h
 - assistant professor – 940 h
 - lecturer / assistant – 960 h

Academic staff members assuming various positions work in the study programme; average hours of the university lecturer were taken to calculate the necessary workloads: $800\text{h (academic work)} / 940\text{h (determined hours for 1 workload)} = \mathbf{0.85}$ workload

- **Funding required for academic staff remuneration per study year** – 980 EUR (university lecturer per 1 workload (Cabinet Regulation No. 445)) * 0.85 load * 12 (months) * 1,2409 EUR (soc. tax) = **04** EUR.
- **Number of students required to cover costs of the academic staff** – at a fixed study fee, the programme must have at least **5** Funding for covering study fees of the study year, provided that this number of students, is 15000 EUR ($5 \times 3000 = 15000$), it will cover the necessary costs (both for teacher salary and others). Funding will equal 30,000 EUR if the planned 10 students are admitted.

As the number of students increase (up to 15) the costs of teacher salary will not increase, because the number of students make one academic and one laboratory work group therefore the classes can overlap. Costs of common infrastructure maintenance will not increase since they do not depend directly on the number of students. Delivery of existing LLU programmes involves materially technical base already in place and will not bring extra costs in programme “Biosystems Machinery and Technologies”.

As the number of foreign students increases considerably, tuition fee will be reviewed to continue delivering good quality studies.

LLU Faculty of Engineering implements related study programme (Agricultural Engineering, Machine

Designing and Manufacturing, Applied Energetics), which operates on the materially technical base built over years, laboratory devices, computer classes and software, which will be used also for implementation of the programme “Biosystems Machinery and Technologies”. For more information about materially technical base of the studies refer to the description of study direction.

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

N/A

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

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

New study programme. Students are not admitted yet.

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

According to the [Law](#) on Higher Education Institutions not less than five professors and associated professors, who are elected in academic positions in relevant higher education institution, must be engaged in delivery of programme’s compulsory section and restricted elective courses.

More than 5 professors are engaged in delivery of the study programme thus meeting the statutory requirements. Programme’s courses will be delivered by 7 professors and 6 associated professors (Table 1). Publications of the academic staff members are summarised in Annex. The academic staff members have published research, which is directly or closely related to the course to be delivered (anex 2_part_6). Majority of academic staff members have been delivering this or similar course also in Latvian, many of them deliver courses also in English for Erasmus students or foreign students studying in LLU. Students and employers’ representatives acknowledged that LLU academic staff members are able and ready to maintain the necessary quality of studies.

Academic staff members engaged in delivery of study programme is highly qualified – 63% of them

are holding degree Doctor of Sciences and 37% of them holding the Master's degree. Academic staff delivering the programme is summarised in annex and summary in Table 1.

Curriculum Vitae of all academic staff delivering the study programme is enclosed in the annex 2_part_4.

Professors and associated professors in environmental engineering science discipline are elected by the Council of Environmental Engineering and Energetics Professors created by LLU where representatives of professional organisations participate. In order for academic staff members to be elected in academic positions, during the intermediary re-election periods, they must fulfil qualification criteria determined by LLU "Regulation on Academic Positions". One of requirements - to attend higher education teachers' professional upgrade programme "Innovations in higher education didactics" every 6 years. In order to upgrade LLU qualification, foreign courses for various levels are offered and seminars and other measures organised.

LLU has introduced qualification upgrade system. Each year the academic staff engages in scientific activity, and also upgrade their qualification, affecting their remuneration. It motivates academic staff to participate in seminars, courses, scientific conferences.

Students are also involved in evaluation of the academic staff. LLU can anonymously evaluate work of the academic staff and give proposals for improving the quality twice a year. Survey results have been summarised in the system and available to each academic staff member, heads of departments/institutes, dean of the faculty and management of LLU.

**Table 1. Academic Bachelor Study Programmes
Summary of academic staff of "Biosystems Machinery and Technologies"**

Positions	Quantity	%
Professor	7	22
Professor (Emeritus)	1	3
Associated professor	6	19
University lecturer	5	16
Visiting university lecturer	1	3
Lecturer	1	3
Assistant		
Visiting lecturers	11	34
Visiting assistants		
Total	32	100
Scientific and academic degrees		
Dr. hab.	0	0
Dr.	20	63
Mg.	12	37
Total	32	100

Delivery of

programme's content might involve cooperation with similar faculties from the Agriculture Academy of Vitautas Magnus University [Kaunas](#), [Estonian](#) University of Life Sciences, [Czech](#) University of Life Sciences Prague and [Warsaw](#) University of Life Sciences. Visiting professors will be invited from the mentioned universities. So far collaboration in academic staff exchange initiative from these universities has been implemented through ERASMUS programme. Academic staff from these universities actively collaborate also in research. It is evidenced by joint publications in

international scientific [conferences](#).

It is planned to invite foreign cooperation partners from other Nordic universities for delivery of the new study programme, and also through NJF network to cooperate both in research and studies. Foreign teachers could better explain specifics of technologies in national and geographical context.

It is important for academic staff members partaking in studies to regularly upgrade and develop new skills and competences, upgrade their professional qualification thus becoming more capable of bringing the best knowledge to students through new and efficient teaching methods. Continued education and qualification upgrade of the academic staff is ensured by attending numerous qualification upgrade and individual professional skills' improvement courses or seminars in Latvia and abroad, participating in organisational and methodological work, international projects, work of other organisations, performing practical work as consultants, and participating in conferences and methodological seminars organised by LLU and other universities every year. The teachers upgrade their qualification through participation in academic staff exchange programmes (for example, ERASMUS). Insights acquired during professional development and qualification upgrade and research are integrated in study process, hereby improving and bettering it.

Long-term academic staff strategy is based on several closely linked principles. Scheduled teacher qualification upgrade measures are implemented in the structural units, and they pertain to updating courses, training of latest teaching methods, IT and foreign language training.

The qualification rate of the teaching staff is also their participation in scientific projects and publicity. Overall has been published more than 300 publications and take part in more than 50 projects. Here have to be emphasized the participation of the teaching staff in different studies, such as "Development of agriculture GHG emission calculation methodologies and data analyses with modelling tools integrating climate change" allows this experience to integrate the study course "Engineering Mathematics". Seeing the use of mathematics in practice, students have a greater motivation to learn this theoretical course.

The teaching staff also participates in projects where agricultural robots are developing: "Development of Robotized Weed Control System", "Event-Based Vision for Agricultural Robot" and "Development of Multiagent Robotized Intellectual System Technology". This experience will be transferred through study courses "Embedded Programming for Engineers" and "Vehicle Technologies and Mobile Robots". The practical and scientific qualifications of this teaching staff are directly transferring the latest knowledge of mechatronic systems in the field of biosystems, helping students better understand individual components of such systems and system as unit. Bachelor's thesis Biosystem Machinery and Technology student must design mechatronic system in the field of biosystems and create a management program for it. As follows, projects created robots are a good example of similar systems development.

Projects: "Development of Harvesting Technologies of Cannabis sativa L. for Product Yield with High Added Value" (only in Latvian); "Use of Electrical Power in Motor Vehicles for Humans" (only in Latvian); "Climate-friendly Livestock Husbandry Systems" (only in Latvian); "Climate Changes in Agriculture"; "Agriculture Greenhouse Gas and Ammonia Emissions and CO₂ Trapping (in Arable Lands and Lawns) Marginal Abatement Cost Curve (MACC) Adjustment for use in Shaping Agricultural, Environmental and Climate Policy" (only in Latvian); "Development of Mechanization Means for Energy Crop Fuel Conditioning"; "Concepts of Using Reed Biomass as Local Bioenergy and Construction Material", "Sustainable Use of Natural Resources to Improve Quality of Public" etc. (see annex Participation_teaching_staff_projects). All these projects are linked to the results of study program Biosystems machinery and technologies, so the integration of these knowledge in study courses is very necessary.

By participating in LLU academic conferences, Innovations in didactics of Higher Education (160 hours) and other events to improve qualification, teaching staff are informed about latest knowledge of study quality indicators, student-centred education and student feedback on the study process as a whole. In the LLU academic conference take part students and teachers from many European countries, there are presentation about the modern training systems and characteristics of students' generations. Learning outcomes can be achieved if the teaching staff have a complete understanding not only about the scientific area, but also of effective training methods, where the student engages in creating of their study curriculum.

Participation in the textbooks and study materials competitions, drives to create modern and qualitative study materials.

During recent reporting years, the academic staff has especially focused on building knowledge in different courses which mainly aim at professional development of the academic staff, and last of them have been implemented directly by means of LLU projects: Online tools for creating interactive presentation and communication, and online survey building; MS cloud services for data storage and sharing; Dynamic and active presentation (immediate features of Power Point and auxiliary plug-ins) etc.

Within the framework of other project (8.2.2.0/18/A/014) the academic teaching staff could improve their professional English, leadership skills, communication and interpersonal skills and to provide academic staff with a possibility to become interns at producing companies between 2019 and 2021. This option is actively used by large part of academic staff members involved in the study programme.

Practice in manufacturing companies gives direct impact on better achievement of learning outcomes, as technologies and equipment used in enterprises, as well as the management system. Many other activities give an indirect contribution to learning outcomes, such as understanding the student-centred teaching process and being able to communicate better with the student, the most appropriate way for student knowledge, skills and competences is found.

4.3. Information on the number of the scientific publications of the academic staff members, involved in the implementation of the doctoral study programme, as published during the reporting period by listing the most significant publications published in Scopus or WoS CC indexed journals. As for the social sciences, humanitarian sciences, and the science of art, the scientific publications published in ERIH+ indexed journals may be additionally specified (if applicable).

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

4.5. Provide examples of the involvement of the academic staff in the scientific research and/or artistic creation activities both at national and at international level (in the fields related to the content of the study programme), as well as the use of the obtained information in the study process.

Academic staff delivering study programme Biosystems Machinery and Technologies have academic freedom in conducting research, according to affiliation of academic staff member to LLU institute or department. Academic staff members work in their scientific discipline within the framework of the study programme, ensuring immediate integration of the latest scientific findings in the study process. It ensures constant inclusion of newest scientific research in the study process, having a positive effect on study work and outcomes.

Publications of the academic staff members are summarised in annex 2_part_6. The academic staff members have published research, which is directly or closely related to the course to be delivered.

Here we can emphasize also participation of different academic staff members in different research, for example “Development of agriculture GHG emission calculation methodologies and data analyses with modelling tools integrating climate change” that will allow integrating this experience into course “Engineering Mathematics”. Academic staff members participate in projects where agricultural robots are developed: “Development of [robotized](#) weed control system” (only in Latvian) and “Event-Based [Vision](#) for Agricultural Robots” (only in Latvian), “Development of Multi-agent Robotized Intellectual System Technology”. This experience will be transmitted through courses “Embedded Programming for Engineers” and “Vehicle Technologies and Mobile Robots”. Similarly, benefit from the university lecturers involved in delivery of study programme Biosystems Machinery and Technologies can be seen from the following projects implemented by the academic staff members: “[Development](#) of Harvesting Technologies of Cannabis sativa L. for Product Yield with High Added Value” (only in Latvian); “Use of Electrical Power in Motor [Vehicles](#) for Humans” (only in Latvian); “Climate-friendly Livestock Husbandry [Systems](#)” (only in Latvian); “Climate Changes in Agriculture”; “Agriculture Greenhouse Gas and Ammonia Emissions and CO2 Trapping (in Arable Lands and Lawns) Marginal Abatement Cost Curve (MACC) Adjustment for use in Shaping Agricultural, Environmental and Climate [Policy](#)” (only in Latvian); “Development of Mechanization Means for Energy Crop Fuel Conditioning”, “Concepts of Using Reed Biomass as Local Bioenergy and Construction Material”, “Sustainable Use of Natural Resources to Improve Quality of Public” etc. (see annex Participation_teaching_staff_projects)

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

Understanding the role of academic staff members, LLU implements academic staff member collaboration in three stages: 1. Academic staff members collaborate to prepare descriptions and updates of study programmes and courses; 2. Academic staff members collaborate to improve methodological work; 3. Academic staff members collaborate in scientific activities.

In order to embody course synergy and harmonise requirements of study outcomes, and to avoid overlapping of content, the study course content is constantly discussed and approved through cooperation of academic staff members engaged in the programme and members of Methodological Commissions. It takes place both in the commission sittings and meetings of institutes / departments, and in informal academic staff gatherings to share information and coordinate work in their courses. Experience exchange among academic staff members regarding the use of modern training methods, functionality of e-studies, development of creative thinking and similar issues is happening on a regular basis. Academic staff members participate also in academic conferences organised every year by LLU, where colleagues from LLU and other universities (also from abroad) share their experience. During conferences they can learn about the recent research and findings, listening to speakers' presentations and meeting in person the colleagues from different education institutions and other organisations in Latvia and abroad.

32 academic staff members participate in delivery of this study programme. There are no students admitted yet, therefore we can only guess the possible student-teacher ratio: 30/32 100/32.

Annexes

III. Description of the Study Programme - 1. Indicators Describing the Study Programme		
Compliance of the joint study programme with the provisions of the Law on Institutions of Higher Education (table)		
Statistics on the students over the reporting period	BMT_5_annex_Student_statistics.docx	BMT_5_pielikums_Studejoso_statistika.docx
III. Description of the Study Programme - 2. The Content of Studies and Implementation Thereof		
Compliance of the study programme with the State Education Standard	BMT_6_annex_Compliance_with_the_state_education_standard.docx	BMT_6_pielikums_Atbalstiba_valsts_izglit_standartam.docx
Compliance of the qualification to be acquired upon completion of the study programme with the professional standard (if applicable)		
Compliance of the study programme with the specific regulatory framework applicable to the relevant field (if applicable)		
Mapping of the study courses/ modules for the achievement of the learning outcomes of the study programme	BMT_8_annex_Mapping_of_study_courses.xlsx	BMT_8_pielikums_Studiju_kursu_kartejums.xlsx
Curriculum of the study programme (for each type and form of the implementation of the study programme)	BMT_9_annex_Study_program_plan.docx	BMT_9_pielikums_Studiju_programmas_plans.docx
Descriptions of the study courses/ modules	BMT_10_annex_Description_of_study_courses.rar	BMT_10_pielikums_Studiju_kursu_apraksti.rar
Description of the Study Direction - Other mandatory attachments		
Sample of the diploma to be issued for the acquisition of the study programme.	BMT-diploma.pdf	BMT-diploms.pdf
Description of the Study Programme - Other mandatory attachments		
Document confirming that the higher education institution/ college will provide the students with the options to continue the acquisition of education in another study programme or at another higher education institution/ college (a contract with another accredited higher education institution/ college), in case the implementation of the study programme is discontinued	LLU_VMU_Agreement.pdf	LLU_VMU_sadarbibas_ligums.pdf
Document confirming that the higher education institution/ college guarantees to the students a compensation for losses if the study programme is not accredited or the licence of the study programme is revoked due to the actions of the higher education institution/ college (actions or failure to act) and the student does not wish to continue the studies in another study programme	LLU_Confirmation_Mehanika_EN.docx	LLU_apliecinajums_Mehnikas_virzienam.edoc
Confirmation of the higher education institution/ college that the teaching staff members to be involved in the implementation of the study programme have at least B2-level knowledge of a related foreign language according to European language levels (see the levels under www.europass.lv), if the study programme or any part thereof is to be implemented in a foreign language.	LLU_Confirmation_Mehanika_EN_change.docx	LLU_apliecinajums_Mehnikas_virzienam_precizets.edoc
If the study programmes in the study direction subject to the assessment are doctoral study programmes, a confirmation that at least five teaching staff members with doctoral degree are among the academic staff of a doctoral study programme, at least three of which are experts approved by the Latvian Science Council in the respective field or sub-field of science, in which the study programme has intended to award a scientific degree.		
If academic study programmes are implemented within the study direction, a document confirming that the academic staff of the academic study programme complies with the provisions set out in Section 55, Paragraph one, Clause three of the Law on Institutions of Higher Education	LLU_Confirmation_Mehanika_EN_change.docx	LLU_apliecinajums_Mehnikas_virzienam_precizets.edoc
Sample (or samples) of the study agreement	BMT-Study_Agreement.pdf	BMT-Study_Agreement.pdf
If academic study programmes for less than 250 full-time students are implemented within the study direction, the opinion of the Council for Higher Education shall be attached in compliance with Section 55, Paragraph two of the Law on Institutions of Higher Education.	CoHE_Conclusion_Biosystems-Machinery-and-Technologies-250.pdf	AIP_Atzinums_Bc_progr_Biosit-masinerija-un-tehnol_250.pdf