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Eesti Maaülikool

Estonian University of Life Sciences

SELF-EVALUATION REPORT FOR INSTITUTIONAL ACCREDITATION

Tartu 2021

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ABBREVIATIONS

ADAPTER – a free service created by the Estonian research and development (R&D) community, to offer simple access to the best of Estonian R&D for all companies and organizations

ASTRA – Institutional development program for research and development institutions and universities funded by the European Regional Development Fund, EMÜ ASTRA Project "Value-chain based bio-economy"

BOVA University Network – forestry, veterinary and agricultural sciences universities of the Baltic countries, founded in 1996. Members: Estonian University of Life Sciences, Latvia University of Life Sciences and Technologies, Aleksandras Stulginskis University, Lithuanian University of Health Sciences

BEENOVA – NOVA sub-network

BioCC – Bio-competence center, founded in collaboration of the universities and enterprises

COMBIVET – ERA Chair of Comparative Medicine under the Institute of Veterinary Medicine and Animal Sciences at the Estonian University of Life Sciences

DOIs – Digital Object Identifiers

ECTS – European Credit Transfer System (EAP in Estonian)

EKA – Estonian Academy of Arts

EKKA – Estonian Quality Agency for Higher and Vocational Education

EMTA – Estonian Academy of Music and Theatre

EMÜ – Estonian University of Life Sciences (Eesti Maaülikool)

ENIC/NARIC – Academic Recognition Information Centre (*ENIC – European Network of National Information Centres on Academic Recognition and Mobility; NARIC – National Academic Recognition Information Centres)*

EPA – *Estonian Academy of Agriculture*

EPMÜ – *Estonian Agricultural University*

EPJ – Estonian Livestock Performance Recording Ltd

EPKK – Estonian Chamber of Agriculture and Commerce

ERA-NET – European Research Area Networks

ESF – European Social Fund

ETAG – Estonian Research Council

ETIS – Estonian Research Information System

EVIKA – Estonian Plant Biology Research Centre

GDPR – General Data Protection Regulation

IA - Institutional Accreditation

IB – International Baccalaureate program

ISE – Index Scriptorum Estoniae

KOTKAS – Environmental Decision Information System

MAK – Estonian Rural Development Plan (ERDP)

MANTEL – Management of Climatic Extreme Events in Lakes & Reservoirs for the Protection of Ecosystem Services

MS – Institute of Economics and Social Sciences

MI – Institute of Forestry and Rural Engineering

NOVA – University Network – Forestry, Veterinary and Agricultural Universities of Nordic Countries

PhD – Doctor of Philosophy

PIP – Knowledge transfer program in the fields of agriculture, food and rural economy

PK – Institute of Agricultural and Environmental Sciences

PRIA – Agricultural Registers and Information Board

PõKa – Estonian Agriculture and Fisheries Strategy 2030 (AFS 2030)

R&D – Research and development

RPL – Recognition of prior learning and professional experience (VÕTA in Estonian)

SAIS – Study Admission Information System

SMEAR – Station for Measuring Ecosystem-Atmosphere Relations

TFTAK – Center of Food and Fermentation Technologies

THE – Times Higher Education University rankings

TI – Institute of Technology

TLÜ – Tallinn University

TTÜ – Tallinn University of Technology

TÜ – University of Tartu

VALORTECH – ERA Chair for Food (By-) Products Valorisation Technologies of the Estonian University of Life Sciences

VL – Institute of Veterinary Medicine and Animal Sciences

VMTD –Veterinary Medicine and Food Science

ÕIS – Study Information System

ZEBE – Centre of Excellence for zero energy and resource efficient smart buildings and districts

1. INTRODUCTION

1.1. ESTONIAN UNIVERSITY OF LIFE SCIENCES OBJECTIVES AND CORE VALUES

Eesti Maaülikool, in English Estonian University of Life Sciences, acronym EMÜ (hereinafter: the University), is an integrated research, development, education and cultural institution with the objective of contributing to the sustainable development of society and the well-being of people, by providing internationally recognised advanced academic teaching, research and development and innovative services based thereon. The University promotes bioeconomy, research and development in the fields related to the sustainable use of natural resources and the development of rural life and rural economy on a value chain basis; provides the opportunities for acquiring higher education based on the development of science and technology on all the levels of higher education in agricultural sciences and veterinary medicine, forestry and environmental sciences and in the area of engineering and technology connected therewith; organises the clinical training of veterinary medicine.

The University core values are:

- **Reliability.** The University is objective, ethical, honest, responsible, fair and professional in its activities. The University cares about its students and employees and ensures that academic continuity and traditions are maintained. The University fosters sustainable and environmentally friendly way of thinking.
- **Academic freedom.** At the University, everyone has the opportunity to present their views and research results free from external restrictions and limitations, and to foster knowledge and serve society in the best possible way.
- **Openness.** The University is open to collaboration and knowledge transfer. The University creates and maintains equal opportunities, tolerant atmosphere and synergy.
- **Creativity.** The University is innovative and open to new ideas. The University develops a creative environment to support the academic curiosity of the academic staff and students.
- **Estonian language and culture.** The University values the preservation and development of the national culture, the creative development of Estonian language of science and university education provided in the mother tongue. The University does its best for the sustainable development of Estonia by providing high-quality research and education and by serving the society.

The mission of the University is to create and share knowledge to the promoters of bioeconomy for the benefit of nature and man. The vision of the University is to be an internationally recognized research university in the field of bioeconomy.

According to the rating agency *Times Higher Education* (THE), Estonian University of Life Sciences is one of the 1000 best universities in the world, ranking between 801 and 1,000. According to the *QS World University Rankings by Subject* by the international consulting company QS Intelligence Unit, Estonian University of Life Sciences is ranked in the range of 51–100 in the field of agriculture and forestry in the world in recent years. The University rose to the top 50 in 2019 and reached the 48th place in 2020. This is the highest ranking of Estonian universities ever. Without a specific position, three other fields of the University have been highlighted in the ranking: veterinary medicine, environmental sciences and earth and water sciences. In the field of plant and animal sciences and the environment and ecology, the University is among the 1% of the most cited research institutions in the world.

In 2019, Estonian University of Life Sciences was the first Estonian university to participate in the *UI GreenMetric World University Rankings* international competition, which compares the impact of universities on the environment and their contribution to more environmentally friendly operations. In 2020, Estonian University of Life Sciences achieved the 352nd place among 780 universities.

Estonian University of Life Sciences is the 4th largest public university in Estonia. The academic centre of the University is in the Tähtvere Campus in Tartu. The University has field bases supporting academic teaching and research: *Järvselja Õppe- ja Katsemetskond* (Järvselja Training and Experimental Forestry Centre), *Võrtsjärve õppekeskus* (Võrtsjärve Learning Centre), *Rõhu katsejaam* (Rõhu Experimental Station), *Polli Aiandusuuringute Keskus* (Polli Horticultural Research Centre), *Eerika katsefarm* (Märja Dairy Research Farm) and *Puhtu välibaas* (Puhtu Field Base). In its activities, the University is guided by the Estonian University of Life Sciences Act, Higher Education Act, Organisation of Research and

Development Act, the administrative agreement between the Estonian Ministry of Education and Research and the University, Estonian University of Life Sciences Statutes, Estonian University of Life Sciences Development Plan until 2025 and other legislative acts.

1.2. ESTONIAN UNIVERSITY OF LIFE SCIENCES HISTORY

Estonian University of Life Sciences carries the continuity of Tartu Veterinary School founded in 1848. Tartu Veterinary School was the first higher education institution in Estonia to provide an agricultural study program on the speciality of veterinary medicine. The School of Veterinary Medicine was transformed into Tartu Veterinary Institute in 1873, which was merged with the University of Tartu in 1919 and renamed the Faculty of Veterinary Medicine. In the same year, the Faculty of Agriculture was established at the University of Tartu, which in 1920 was split into departments of Forestry and Agronomy, comprising not only plant breeding, but also animal sciences. In 1946, the Faculty of Forestry was established.

Estonian Academy of Agriculture (*Eesti Põllumajanduse Akadeemia*, EPA) was formed from the aforementioned three faculties in 1951, and renamed Estonian Agricultural University (*Eesti Põllumajandusülikool*, EPMÜ) in 1991. In the 1990s, a number of research institutes were merged with EPMÜ: Institute of Rural Development (*Maaelu Arengu Instituut*), Estonian Research Institute of Animal Husbandry and Veterinary Science (*Eesti Loomakasvatuse ja Veterinaaria Teadusliku Uurimise Instituut*), Estonian Institute of Forestry and Nature Conservation (*Eesti Metsamajanduse ja Looduskaitse Teadusliku Uurimise Instituut*), Institute of Zoology and Botany (*Zooloogia ja Botaanika Instituut*), Institute of Experimental Biology (*Eksperimentaalbioloogia Instituut*) and Estonian Plant Biology Research Centre (*Eesti Taimebioloogia Uurimiskeskus,* EVIKA). Almost all veterinary, animal science, agricultural and forestry research in Estonia and a large part of biological research were concentrated in EPMÜ.

The academic structural units of EPMÜ were restructured in 2005 and five institutes were formed. The name of Estonian Agricultural University was changed on 27.11.2005. Since then the official name is Estonian University of Life Sciences, which reflects the new direction of the University – to offer education in bio- and environmental sciences in addition to the traditional agricultural sciences. Further information on the history of the University on the home page. Estonian University of Life Sciences renewed also a logo and visual identity.

1.3. MANAGEMENT AND STRUCTURE

Pursuant to the Estonian University of Life Sciences Act, as of 1 January 2020 the highest governing body of the University is the University Council, which is responsible for the long-term and sustainable development of the University and for making relevant economic, financial and property decisions. The academic decision-making body of the University is the Senate, which is responsible for the research, development, creative and academic activities of the University, and for ensuring the high quality. The Rector is the legal representative of the University. The Rector leads the day-to-day activities of the University. The procedure for forming the Council and Senate and the elections of the Rector are provided in the Statutes of the University.

The structural units of the University are the units of academic structure and support structure. Academic structural units organise research and development and teaching/studies. The academic structural units of the University are the Institute of Economics and Social Sciences (MS), the Institute of Forestry and Rural Engineering (MI), the Institute of Agricultural and Environmental Sciences (PK), the Institute of Technology (TI), the institute of Veterinary Medicine and Animal Sciences (VL), College of Technology, Language Centre and Centre for Science Studies Karl Ernst von Baer's House. The principles for the activities of the institutes are provided in their statutes (*in Estonian*), and the highest decision-making body of the institutes is the council of the institute. Institutes of the University are administered by directors, who are responsible for the institute and its development, also the legitimate and efficient use of financial resources.

The units of the University support structure manage, direct and assist teaching/studies, research and development, and organise financial and administrative activities and personnel work. The support structure comprises the library, Open University and administrative units.

Estonian University of Life Sciences is responsible for research and development in the fields of sustainable use of natural resources and rural life/economics; develops its ability to address various areas of

bioeconomy in research and development in a coherent and value chain-based manner, thereby increasing the University's international visibility and impact, also the volume of applied research, product development and knowledge transfer carried out in collaboration with enterprises. The collaboration in the responsibility areas of academic activities of the University are concentrated into six focus areas: agriculture, environment, forestry, food and health, engineering and technology, and rural economics.

The responsibility areas of academic activities are represented by chairs of the corresponding names: Chair of Crop Science and Plant Biology, Chair of Horticulture, Chair of Plant Health, Chair of Soil Science, Chair of Environmental Protection and Landscape Management, Chair of Landscape Architecture, Chair of Biodiversity and Nature Tourism, Chair of Hydrobiology and Fishery, Chair of Animal Breeding and Biotechnology, Chair of Animal Nutrition, Chair of Aquaculture, Chair of Veterinary Bio- and Population Medicine, Chair of Clinical Veterinary Medicine, Chair of Food Science and Technology, Chair of Food Hygiene and Veterinary Public Health, Chair of Silviculture and Forest Ecology, Chair of Forest Management Planning and Wood Processing Technologies, Chair of Geomatics, Chair of Rural Building and Water Management, Chair of Biosystems Engineering, Chair of Energy Application Engineering, Chair of Rural Economics.

To enhance the coherence and synergy of the University focus areas and responsibility areas for academic activities, Estonian University of Life Sciences will implement a new structure from 1 January 2022 (**Figure 1**). According to the Senate decision, Estonian University of Life Sciences will comprise three institutes as of 2022: the Institute of Agricultural and Environmental Sciences, the Institute of Forestry and Engineering, and the Institute of Veterinary Medicine and Animal Sciences.

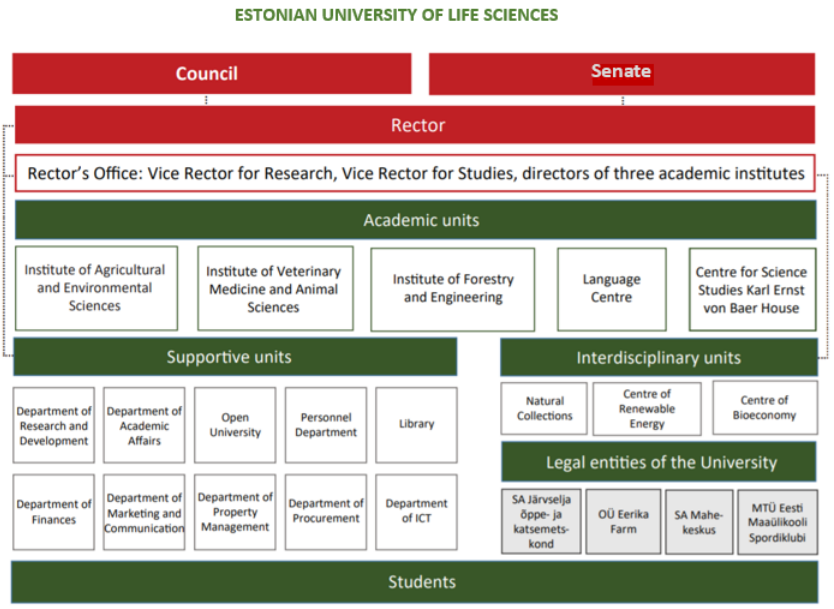

Figure 1. Estonian University of Life Sciences, structure from 01.01.2022.

With the implementation of the new structure, the number of students and staff in the institutes will be harmonised and the financial flexibility of the institutes will increase. According to the new regulation, the directors of the institutes are members of the Rector's Office.

1.4. AGGREGATE DATA ON EMPLOYEES

As of 31 December 2020, Estonian University of Life Sciences had 945 employees working under employment contracts, 478 of them in academic positions. The Rector of the University works under a contract for services. There were 74 international staff members, incl. 60 in academic positions. The University international staff came from 28 countries. Aggregate data on the employees of Estonian University of Life Sciences for the last five academic years are presented in **Table 1**. (At the time of submitting the report, the number of employees was 986, 493 of them in academic positions.)

Table 1. Aggregate data on the employees for the academic years 2016/2017–2020/2021 (*as of 31.12 for each year*)

	Academic year				
	2016/2017	**2017/2018**	**2018/2019**	**2019/2020**	**2020/2021**
Academic staff total (women/men)	425 (208/217)	449 (225/224)	477 (240/237)	492 (237/255)	478 (229/249)
Academic staff with PhD	221	223	228	232	264
Average age	46	46	46	46	47
International academic staff	28	30	51	61	60
Support personnel staff	458	467	450	457	467
Total	**883**	**916**	**927**	**949**	**945**

1.5. AGGREGATE DATA ON STUDENTS

Aggregate data on the students for the academic years 2016/2017–2020/2021 are presented in **Table 2**. A more detailed overview of student data is provided in Chapters ***3.5. Internationalisation***.

Table 2. Aggregate data on the students for the academic years 2016/2017–2020/2021

	Academic year				
	2016/2017	**2017/2018**	**2018/2019**	**2019/2020**	**2020/2021**
Number of students	**(Date 10.11 for each year)**				
Bachelor's studies	1456	1317	1205	1141	1236
Professional higher education	132	126	133	156	173
Integrated engineering studies	263	228	198	190	211
Veterinary medicine	338	328	334	331	352
Master's studies	849	786	766	771	764
Doctoral studies	220	221	222	222	225
Total	**3258**	**3006**	**2858**	**2811**	**2961**
Number of foreign students	**(Date 10.11 for each year)**				
Bachelor's studies	1	2	1	1	1
Professional higher education	0	0	0	0	0
Integrated engineering studies	0	0	0	0	0
Veterinary medicine	168	168	183	189	201
Master's studies	15	10	18	31	25
Doctoral studies	36	38	48	51	57
Total	**219**	**218**	**250**	**272**	**284**
Number of admitted students	**(Date 11.11–10.10 for each year)**				
Bachelor's studies	445	390	392	382	471
Professional higher education	47	41	56	58	61
Integrated engineering studies	34	38	47	47	65
Veterinary medicine	62	65	65	68	71
Master's studies	297	254	262	292	263
Doctoral studies	34	33	30	32	31
Total	**919**	**821**	**852**	**879**	**962**
Number of drop-outs	**(Date 01.10–30.09 for each year)**				
Bachelor's studies	323	316	276	237	255
Professional higher education	33	39	28	31	46
Integrated engineering studies	45	56	35	29	37
Veterinary medicine	22	18	21	9	12
Master's studies	150	130	164	139	168
Doctoral studies	17	26	28	15	26
Total	**590**	**585**	**552**	**460**	**544**
Number of graduates	**(Date 01.10–30.09 for each year)**				
Bachelor's studies	266	243	229	181	219
Professional higher education	21	11	12	15	11
Integrated engineering studies	31	30	25	21	13
Veterinary medicine	56	43	52	43	45
Master's studies	193	179	152	150	169
Doctoral studies	18	12	13	17	21
Total	**585**	**518**	**483**	**427**	**478**

The number of Estonian students in higher education has decreased by an estimated 35% over the last 10 years. The decrease is remarkable in the number of students at Estonian University of Life Sciences as well. Even though the last two years (2021 and 2020) have seen stabilising in the number of students and even a slight increase in the number of applicants, the number of students has decreased the most in the first level of higher education. The reasons vary and are partly related to the general decline in the birth rate as well as to the process of reducing and merging universities curricula. As of 10.11.2020, Estonian University of Life Sciences had 2,961 students, 10% of whom were foreign students. (At the time of submitting the report, the number of students was 2,973, 11,4% of whom were foreign students.)

1.6. THE PROCESS OF PREPARING THE UNIVERSITY SELF-ANALYSIS AND REPORT

Preparations for the University self-analysis and institutional accreditation (IA) began immediately after the Estonian Quality Agency for Higher and Vocational Education (EKKA) Evaluation Council on 29.08.2019 decision was delivered. The University analysed the areas for improvement, recommendations, shortcomings and development proposals described in the decision and in the report of the International Evaluation Committee (September 2019), introduced them to the University membership (October 2019 and January 2021) and prepared an action plan (October 2019).

In September and October 2019, discussions took place at the level of the University Council, institute councils, management, directors, directors of academic affairs, heads of curricula and chairs, and heads of support units, which resulted in an action plan based on the standards, to eliminate the shortcomings identified in the IA decision, during the internal evaluation of the University, as well as during the previous external evaluations (incl. the evaluation of the curriculum group). Persons and units responsible for each activity, also deadlines, were assigned. The implementation of activities was constantly monitored and the situation was analysed by the management every two to three months.

Teams and a steering group, lead by the Rector, were formed by Rector's Order as of 23.04.2021 for self-analysis and for preparing the report. Academic working groups of staff and students, lead by heads responsible for the University strategic areas, prepared the standards based self-assessment reports. The heads of the working groups were members of the steering group. In order to compile the University self-analysis, regular meetings and discussions took place both within and across the working groups with the directors of the institutes and the heads of the chairs.

The interim self-analysis report of the University was completed and submitted to the Rector 1.09.2021, followed by wide-ranging discussions with the University membership and feedback. The deadline for completing the final version of the self-assessment report was 01.12.2021; the report was approved by the Senate and Council.

2. MAIN CHANGES FOLLOWING RECOMMENDATIONS FROM PREVIOUS INSTITUTIONAL ACCREDITATION

The chapter provides a brief overview of the main changes and developments during the two periods between the institutional accreditations. Further information on development activities can be found in the self-assessment chapters accordingly.

Strategic management

Recommendations. *Increase involvement of the University membership in the preparation of the development plan. The development plan has several sub-strategies, it is recommended to compile one complex strategy and to involve the entire membership of the University to review and update the strategy. To implement the development plan and to measure the impact in specific units, measurable target values should be added to the action plan. In the development plan, incl. the SWOT analysis, more attention should be paid to the areas of improvement highlighted in the EMÜ self-assessment report. Discussions on EMÜ as the bioeconomy promoter should be more inclusive for the membership.*

Activities. The process of preparing the action plan 2021–2025 for the University Development Plan 2016–2025 started in the spring of 2020. For working out the action plan, the University membership was involved – the members of the chairs, departments and the Student Union could make proposals to the action plan of the development plan. Discussions took place in the chairs and departments, as well as at the

level of the institutes and the University management, and the Senate. Proposals were submitted and opinions expressed until December, when the University Council approved the development plan for the period 2021–2025.

In recent years, several relevant strategies and documents supporting the development and achievement of the University objectives have been updated or composed accordingly, e.g. the Strategy of Estonian University of Life Sciences until 2025 "Green University", which emphasizes and clarifies the University's green principles in developing the University as a whole, in the teaching process and in campus design, Estonian University of Life Sciences research and development strategy until 2025 "Knowledge-based bio-economy", which sets out the objectives and priorities for research and development according to the mission and vision of the University and the Territorial-Spatial Development Plan (*in Estonian*), providing the general principles for the development of the campus and outdoor facilities and the basis for determining the use of the University buildings and green areas, for planning investments and making property transfer or sale decisions. In the process of developing strategies and new documents, the previous strategies were considered, and gradually integrated into new ones where possible.

In 2018–2019, the development plans of the institutes and chairs were updated, measurable target values were included in the action plans of the development plans to assess the effectiveness of the activities based on the University development plan. Furthermore, the strategic strengths and weaknesses of the institutes and chairs were analysed, incl. the strategic strengths and weaknesses relevant for ensuring the functioning of the University as a whole. The analyses results of the structural units were an input in compiling the activity plan for the University Development Plan 2021–2025.

To raise awareness of bioeconomy issues, all experts in the field from the chairs concerned are involved at the University level. Under the leadership of experts, joint activities aimed at bioeconomy (seminars, hackathons, conferences, trainings, etc.) were organized within the University and in collaboration with other institutions. The target group is the University membership (students, researchers, lecturers, support staff, alumni), the public and private sectors within the University focus areas, and any citizen interested in bioeconomy. The activities are organised bearing in mind that all participants should be actively involved (discussions, workshops), and case studies of success of practitioners are presented (incl. visits) in Estonia and elsewhere in the world. The University and the partners participate in the following events: Smart Thursdays; ADAPTER Cooperation Festival; and an annual bioeconomy conference in November, seminars/conferences in different focus areas. To promote bioeconomy, the University integrates the global sustainable development goals (UN, 2015–2030) to its curricula and research. Pursuing these goals support the activities of students and the entire academic membership, aimed at bioeconomy, to disseminate knowledge about bioeconomy to the wider society. A module on "Environmental management and bioeconomy" has been included to all curricula at the first level of higher education, one of the aims of which is to explain the students the general cause-effect-mitigation relationships of environmental problems, incl. the role of everyone in the process, and to convey knowledge about sustainable circular bioeconomy and green technologies in Estonia and elsewhere. An English taught module is also under development to improve the bioeconomy studies in the University. The University experts participate in different national working groups that define research based and nationally significant developmental areas of bioeconomy and circular economy to support the EU Green Deal.

Resources

Recommendations. *Lack of specific maintenance contracts for project-funded equipment is a threat to the continuity of world class research, so various risk mitigation measures should be considered.*

Activities. To keep the research equipment up-to-date, the University established a depreciation fund in 2016. Equipment maintenance conditions and requirements are included in the equipment procurement descriptions. In case of significant and resource intensive purchases, funds are allocated from the Rector's reserve, if necessary.

Quality culture

Recommendations. *The "EMÜ Quality Strategy for Studies", adopted in 2005, contains too few indicators of expectations on the University quality culture in general, therefore the common basis and principles for quality assurance should be extended.*

Activities. The University quality management system was developed and documented in the spring of 2021. The document provides the definition of the University quality processes, incl. the teaching/study process, describes the objectives, principles and specific level approaches applied to ensure quality. In the process of the quality management, the principles of the University internal evaluation, incl. the internal evaluation of the curricula, were developed. The quality management system was completed in collaboration and agreement with the University membership. From January 2020, the University employed a quality manager. Further overview of the University quality management system is provided in Chapter ***3.3. Quality culture***, for the information on the internal evaluation of the curriculum see in Chapter ***3.7. Curriculum***.

Academic ethics

Recommendations. *It is important to integrate all relevant ethical dimensions into regulations in the field of education. The assurance of equal treatment should be more specifically framed in policies and guidelines. Clear ethic principles on academic freedom and obligations need to be formulated and disseminated among all members of the University.*

Activities. In the period between evaluations, the University has been active in informing students and academic staff about academic ethics and involving them in the development of the principles of the Code of Conduct for Academic Integrity at the University.

A seminar on the principles and implementation of the code of conduct for academic integrity took place at the University on 02.10.2020. The principles and agreements dealt with and discussed at the seminar formed an input for amending the regulation "Application of Principles of Academic Ethics in Estonian University of Life Sciences" established by the University Council in 2018. The new regulation "Good Academic Practice and Implementation of Principles of Academic Ethics in Estonian University of Life Sciences" entered into force on 01.12.2020. The regulation also established the procedures for the Academic Ethics Committee, as well as the principles and procedures for handling suspicions and complaints to ensure the fairness, impartiality and transparency. The Academic Ethics Committee was established 27.05.2021. Previously, cases concerning ethics were proceeded by the Senate Academic Committee.

Procedures for handling violations of the principles of the code of conduct for academic integrity (incl. academic fraud) were regularly introduced to students, academic staff, heads of curricula, course supervisors, directors of academic affairs and study organisation specialists. First year students are introduced to the principles of the code of conduct for academic integrity within the framework of activities of the orientation week, information sessions and subjects, first and foremost in the subject "Introduction to the speciality". The study organisation rules were supplemented with the principles of good academic practice (honesty, fairness, caring for each other and respectful behaviour, good communication and attitude, and open collaboration). The issues of academic ethics are addressed in tutor trainings and events organized for the student council. A University action plan for gender equality and a guide to equal treatment are being developed.

Internationalisation

Recommendations. *EMÜ should strive to better integrate international and Estonian students to promote societal cultural openness. For instance, there is "a Special feedback system for international students". Having separate systems can potentially counter efforts for greater integration. A plan for increasing instruction in English should be worked out. EMÜ should continue the implementation of courses and programs that enhance English proficiency among academic and support staff. Ensure that internationalisation in its various forms reaches all students and academic staff.*

Activities. To offer wider study opportunities to foreign students and to integrate Estonian and foreign students more effectively, the University has increased the number of subjects taught in English in recent years and achieved the goal of the development plan of at least one English taught module in curricula per semester by the end of 2020. Subjects taught in English are studied together with Estonian students and information on subjects taught in English can be found on homepage.

Increase in the number of curricula with English as the language of instruction has in turn increased the number of English taught subjects for Estonian and foreign students together. In the academic year

2022/2023 the University will open 5 curricula with English as the language of instruction, and it is planned to open 2 more curricula a year later (Chapter ***3.5. Internationalisation***).

In the Action Plan 2021–2025 of the Estonian University of Life Sciences Development Plan until 2025, the University has set the goal that curricula with Estonian as the language of instruction include at least one speciality taught in English to support international environment and acquisition of English for specific purposes.

The bilingual events organised by the Student Union also provide integration opportunities for students. International students are supported by tutors or buddies – Estonian students who help them adapt and understand the local culture.

The Study Information System (*Õppeinfosüsteem, ÕIS*) feedback survey on subjects and teaching is the same for all students.

The ASTRA program and other projects have supported and increased the two-way mobility of academic staff in 2016–2020. Further details on internationalisation in Chapter ***3.5. Internationalisation***.

Academic staff

Recommendation. *In the last five years, the total number of lecturers has remained around 450, but the number of lecturers with PhD degrees has decreased from 246 to 223. Considering the goal set by the University that all university teachers in the position of at least a lecturer should have a doctoral degree by 2020, this is a very relevant area of improvement.*

Activities. According to the Higher Education Act, which entered into force 1.09.2019, the positions of lecturers and researchers are no longer differentiated and a common definition of an academic staff member is used. According to the objectives of the University Development Plan, the University has purposefully directed research fellows to educational activities since 2016, and has specified in the job description of academic staff the requirement for educational activities for the position of a research fellow as well. Due to the changes, the share of academic staff with a PhD degree or a corresponding qualification participating in teaching has increased year by year (**Table 12**), incl. the positions of lecturers.

The University has specified that from January 2020, it is not possible to work as a senior lecturer without a PhD degree or a corresponding qualification. Persons working as lecturers prior to 01.01.2020 and not having doctoral degree, must meet the requirements for the position of a lecturer by the term of staff evaluation.

Curriculum

Recommendations. *To be an internationally recognised university in the field of bioeconomy, the University should faster integrate globally relevant agronomic and marketing issues in the curricula, ensure better balance between production and marketing of agricultural production subjects in the curricula and provide more subjects taught in English. Production and Marketing of Agricultural Products curricula should be strengthened with business and marketing knowledge, and the content of the curriculum courses and literature should be updated. Several curricula have difficulties in filling student places in agreement with the state commission. Agricultural sciences (excl. veterinary sciences) are not the first choice for student candidates, therefore admission is lower than expected. Internal and external stakeholders should work together in marketing curricula to increase enrolment.*

Activities. Topics related to sustainable development goals are integrated into the curricula. Since the admission of the academic year 2020/2021, all first level higher education curricula include a module on "Environmental management and bioeconomy" (8 ECTS) and a module on "Entrepreneurship" (8 ECTS). Further information on the structure and changes in curricula in Chapter ***3.7. Curriculum***.

All the University curricula were updated for the admission of the academic year 2020/2021, incl. the bachelor's and master's degree curricula for the "Production and Marketing of Agricultural Products": the structure, learning outcomes and content of the curricula were amended, business and marketing aspects were added as sub-modules of the curricula.

Marketing campaign to potential applicants was updated in the spring of 2019, the "My Choice" campaign distributed in various media channels. In collaboration with stakeholders, speciality targeted campaigns were organised and promoting videos were made with well-known alumni speaking about their speciality

and profession. Representatives of the University visited upper secondary schools and vocational schools, admission information was specified and updated on the University website. As a result of marketing, the number of applicants has somewhat increased (**Table 2**).

Learning and teaching

Recommendations. *The learning outcomes of master's curricula need to be made learner-centred and more reflective of the level suitable for master's studies. Specific training is needed to improve the implementation for a student-centred approach, to make the staff aware of the essence of the method. Admission criteria and requirements need to be made more understandable to student candidates in all curricula. Improve students' awareness of how their feedback helps to improve teaching and learning. Assess the causes of drop-outs and take preventive measures (forestry).*

Activities. In 2018, new requirements were established for the content and structure of curricula. At the University, the learning outcomes of the curricula were updated in accordance with the provisions of the Standard of Higher Education *(in Estonian)* and the level of higher education. The subject learning outcomes of the curriculum were formulated in a more student-centred approach, and the connections between the learning outcomes and the assessment methods and criteria were highlighted more clearly for the subjects. Further information on curriculum development in Chapter ***3.7. Curriculum***.

In the period between assessments, the University actively engaged in training academic staff provide various trainings in teaching-related approaches, incl. learner-centred approaches.

Admission requirements and procedure have been formulated more clearly and admission criteria for the respective speciality added to the curricula on the University website, also the possible special conditions, e.g. replacement of national examination results for those who have not passed national examinations, incl. the graduates of vocational secondary education, as well as those who passed the national exams before 2014; and the principles for calculating competition points. Further information on admission requirements and procedure in Chapter ***3.8. Learning and teaching***.

The University has analysed the reasons for drop-out and implemented various preventive measures, which are described in more detail in Chapter ***3.10. Study support systems***.

Student assessment

Recommendations. *Subject assessment methods should be better linked to learning outcomes and assessment methods should be described in more detail so that they are more aligned with achieving and supporting the learning outcomes, incl. general competences. The assessment criteria should also be described in more detail. Developing a transparent system for giving students feedback on the achievement of learning outcomes. Defining criteria for evaluating group work, which would also allow assessing the individual contribution of each student.*

Activities. Assessment of students' knowledge and skills has been made more learning outcome based. In 2018–2021, the objectives and learning outcomes of all curricula were specified and assessment methods updated. Multiple trainings and exchanges of experience were organised for academic staff to implement learning outcomes-based assessment, incl. more detailed descriptions of assessment criteria. The skills of academic staff to relate assessment criteria to learning outcomes of subjects and to give feedback to students based on the learning outcomes of the subject have improved, as evidenced by rising positive feedback from students through the Study Information System ÕIS (**Table 20**).

Academic staff use various methods to provide feedback: generated automatically in the system (e.g. Moodle learning environment, explanation with the correct answer in case of a wrong answer), personal feedback, e-learning environments and peer assessment. The University monitors staff feedback to students via feedback provided by students, and the concerns are discussed with the subject teacher. Further information on assessment, incl. feedback on acquiring learning outcomes, in Chapter ***3.9. Student assessment***.

Study support systems

Recommendations. *Staff involved in advising students need to improve their English. The expected learning outcomes need to be more clearly communicated to prospective students, to prevent misleading information causing drop-outs and early leavers. Identify the root causes of early and pre-graduation drop-out and implement preventive measures*

in the study organisation and support systems. Pay attention to the financial situation of students and how this may negatively affect their learning progress.

Activities. International students are provided with study, psychological and career counselling in English. English language skills of the staff communicating with international students have improved; the University has offered various English language courses to the staff. Since September 2021, two psychologists work as psychological counsellors for students, incl. international students.

The University has formulated more clearly the expected learning outcomes and communicated them more effectively to prospective students. The University monitors the reasons for drop-out and implements preventive measures. Further information in Chapter ***3.10. Study support systems***.

In order to alleviate the economic difficulties, the University allows students to pay the invoice for reimbursement of study expenses issued due to study debts incurred during the completion of the curriculum on the basis of a payment schedule. If debts have arisen due to the COVID-19 pandemic, no claim for the reimbursement of study expenses has been submitted. Since autumn 2019, the University enables students to participate in studies during their academic leave.

Service to society

Recommendations. *Find opportunities to engage alumni more in giving information about prospective job perspectives to potential students as well as graduates. Create more detailed analyses of continuing education courses by EMÜ to better reflect the society's needs.*

Activities. The University has a large and cohesive Alumni Association and a very efficient Alumni Board. Alumni are happy to collaborate with their university, incl. through exchange of knowledge and experience.

Alumni are involved in the orientation week of first-year students: they share their work experience, explain the possibilities of applying the acquired knowledge and skills in choosing and finding jobs, and offer opportunities for internship. In several cases, alumni as employers provide students practical training in their companies.

Employer alumni participate in the annual University career day, present as guest lecturers, participate as co-supervisors in preparing graduation theses, offer scholarships to conduct research in their company's field of activity, etc.

The analysis of continuing education courses and training was conducted in the autumn of 2020, during which promising areas were mapped, such as construction, technology, circular and carbon economy, which will be further developed in the form of continuing education. Sectoral demand in society was analysed to identify the needs for providing market-based training and courses.

3. UNIVERSITY SELF-ANALYSIS BASED ON INSTITUTIONAL ACCREDITATION STANDARDS

3.1. STRATEGIC MANAGEMENT

The strategic management of Estonian University of Life Sciences is based on the legal acts and strategic directions regulating higher education in the Republic of Estonia and is in line with the mission, vision and core values of the University and the corresponding objectives. Strategic management comprises developing, implementing and evaluating effectiveness of the University strategy; management is based on analysis of the University development, analysis of internal and external environment, feedback from stakeholders and future forecasts. Strategic management is supported by the University quality management system, which operates on the principle of continuous improvement, i.e. the University processes are planned, implemented, controlled and modified, and considering the needs and expectations of the University stakeholders (see Chapter ***3.3. Quality culture***).

Within the frame of strategic management, the University membership and stakeholders are involved, motivated and supported in setting and fulfilling long-term development objectives of the University and in shaping the University identity, with the changing needs, constraints and opportunities being considered.

The mission, vision, core values, strategic areas, long-term goals and objectives of the University are defined in Estonian University of Life Sciences Development Plan until 2025 and are supported by the most important strategic strength of the University, which is **the ability to address areas of bioeconomy in a coherent and value-chain-based way**. Focusing on this strategic strength and considering the needs of society and the interests of the University membership, the University vision is to be an internationally recognised research university in the field of bioeconomy.

EMÜ development plan and action plans of development plan

Planning the development of the University is based on its strategic strength and objective to follow its mission, vision, core values and goals, considering national and international development trends. On the basis of the Statutes, the University Council regulation in 26.11.2015 established the Development Plan of Estonian University of Life Sciences until 2025. The development plan was based on the results of the previous development plan of the University and took into account the principles and objectives set out in the European Union and Estonian strategic documents, administrative agreements between the Estonian Ministry of Education and Research and the university, and the agreement on good practice and quality of Estonia's Higher Education Institutions.

The University Development Plan 2016–2025 sets out the strategic areas of development: research and development, teaching/studies, membership, society and organisation. To increase the strategic strength of the University, the long-term development objectives, goals and links between the strategic areas of the University are planned until 2025 (**Figure 2**). The Action Plans for 2016–2020 and 2021–2025 define sub-objectives, activities, indicators and their target levels. The activities of the periods are planned and the implementation of the action plan is monitored by calendar year and at the end of the period. The results of the previous period are the input to the action plan for the next period.

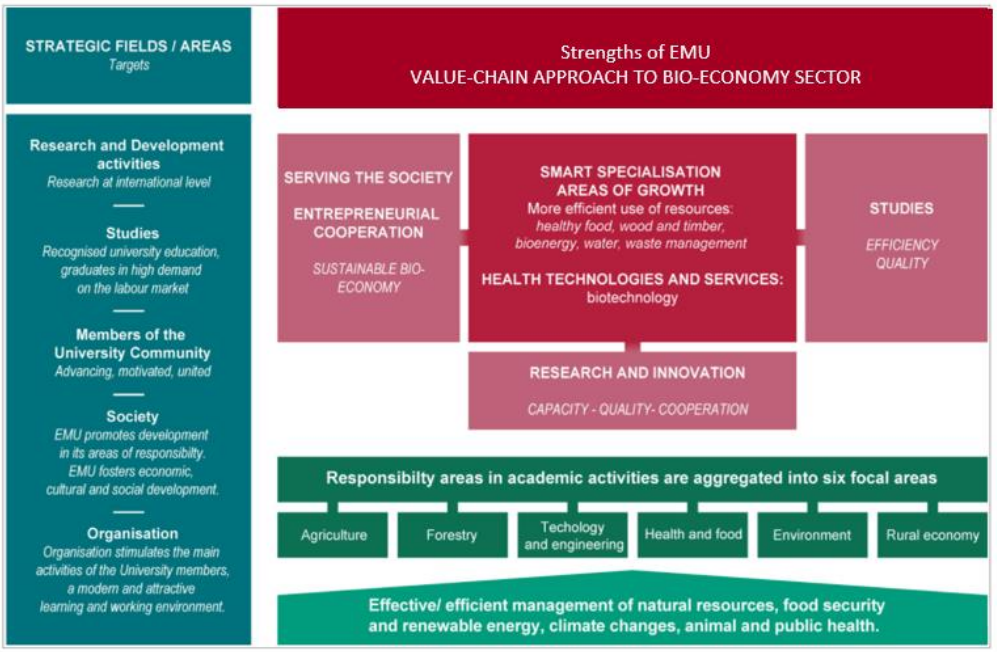

Figure 2. Development goals and sectoral connections to increase the strength of the University.

To prepare the 2021–2025 action plan, a comprehensive and thorough self-assessment was carried out during 2020, which included an analysis of implementation of the development plan during 2016–2020, analysis of the performance of institutes and the areas of the responsibility of academic activities, and an analysis of the functioning of the University as an institution, the basic processes and quality management system, in accordance with the standards and methodology of institutional accreditation. Likewise, the University strengths, weaknesses, opportunities and possible hazards were re-examined. Members of the structural units, and the Student Union, made suggestions regarding the sub-objectives, activities, indicators and their target levels of the 2021–2025 action plan. The input was analysed and discussed at the University development seminar. The sub-objectives agreed upon, the most important long term and higher impact activities, indicators and target levels were discussed in the research councils of the institutes and the Senate, and approved by the University Council.

An action plan by strategic areas is also drawn up for each calendar year and it includes a list of the activities, the need for financing and the structural units responsible for the activities. The annual action plan is approved together with the University budget by the University Council. The University membership, incl. students, and external stakeholders are involved in drawing up the annual action plans. An overview of implementing the annual action plan is provided in the annual report of the financial year, which is discussed in the University Senate and approved by the University Council. The Annual Report is public and available on the University website.

On the basis of the University development plan, the development plans for academic structural units, responsibility areas of the academic activities and the University institutions are developed, as well as documents guiding the development for specific activity areas (Territorial-Spatial Development Plan (*in Estonian*), Strategy of Estonian University of Life Sciences until 2025 "Green University", Estonian University of Life Sciences Research and Development Strategy until 2025 "Knowledge-Based Bioeconomy").

The development plans and action plans of the University institutes and responsibility areas of the academic activities are based on the goals and objectives set out in the University development plan. Preparation of the development plan of each institute and responsibility area of the academic activities includes a SWOT analysis, focusing on strategic strengths and weaknesses of institutes and chairs representing the responsibility areas that influence the functioning of the University as a whole. The action plans of the institutes development plans contain measurable target values for the evaluation of the results, which may differ somewhat from the target values set in the University development plan, because the initial level of the respective indicator of the institute is considered. The results of the academic responsibility areas are discussed in the University seminars every year. The results of the analysis of the structural units are an input for preparing the action plan of the University development plan (incl. action plan 2021–2025).

Involvement of University membership and non-university stakeholders

The University considers it relevant to involve its membership and stakeholders in shaping the development of the University. In the process of preparing the University Development Plan 2016–2025, development plan seminars and development conferences were organised for all the University membership, as well as online surveys to update the wording of the University mission and vision, and to find out the priorities of the development plan activities. The University membership has been involved in the preparation of the action plan and annual action plans and in the analysis of the results in their structural units through discussions on relevant topics, development seminars, the work of councils of institutes and the Senate.

Representatives of society are actively involved in strategic management of the University through representation in the University decision-making bodies. Four of the seven members of the University Council are outside the University. Before the University Council was established, until the end of 2019, a similar function of connecting the University and the society was performed by the Board of Governors, which was a 15-member advisory body appointed by the Government of the Republic of Estonia.

Representatives of non-university stakeholders are in the councils of each institute and in the councils of interdisciplinary centres (Centre of Bioeconomy and Centre of Renewable Energy). Students are represented in the University Senate and institute councils. The Rector's Office has close contacts with the Student Union, regular meetings in a relaxed atmosphere being held, which is important both for receiving feedback on the functioning of the University main processes and for listening to and taking into account students' ideas and suggestions in shaping the University's future.

The University alumni association has a relevant role in directing the development of the University and implementing its activities. The tasks of the alumni association include advising the activities of the University and providing information on the activities and developments of the University to the alumni community and the general public. The University has more than 27,000 alumni.

The University membership and external stakeholders are involved in the development of the University via regular feedback in various surveys and questionnaires.

EMÜ development plan 2016–2025 and activity plan 2016–2020 results

A significant achievement for the University is the rise of Estonian University of Life Sciences to the top 50 universities in the world in the field of agriculture and forestry (*QS World University Rankings by*

Subject) and becoming one of the world's top 1000 universities in the *Times Higher Education* rankings, ranging from 800 to 1,000.

One of the success factors is the concentration of the development of the academic activity responsibility areas in chairs based on academic activity responsibility areas. By 1.09.2017, 22 chairs were formed from the previous 37 departments and units; since 1.01.2022 the University continues with 20 chairs. Most of the chairs are headed by Chair Professors elected via international competition, three chairs have temporary chair-holders.

According to the objectives of the Development Plan period 2016–2020, the volume of the University research and development increased, incl. the number of publications at the international level per academic staff, the number of EU funded projects, the number of collaborative projects, the number of projects of young research fellows' supported and the accrued income from research and development. Internationalisation of studies expanded, reflected in the number of English taught curricula and modules as well as the increase in the proportion of foreign students. The drop-out rate decreased, being also one of the targets. The effectiveness of PhD studies and the number of master's students still need to be improved or the target levels reviewed. The research and teaching/studies target levels of the 2016–2020 action plan of the development plan is presented in **Table 3**.

Table 3. Estonian University of Life Sciences research and teaching/studies target levels of the 2016–2020 action plan of the development plan

Indicator	Base level 2015	Target level ≥2020	2020 performance
Publications per academic staff member per year	0.45	≥ 1	WoS 0,91; Scopus 1,09 Total 1.18
International conferences per focus area during 5 years	< 1	≥ 1	> 1
Percentage of foreign staff among academic staff	5%	≥ 10%	> 15%
Young research fellows funded	1	3	9
EU projects per focus area	Fewer than one project per focus area	≥ 1	environment 30; food and health 12; agriculture 14; engineering and technology 5; rural economy 4; forestry 2
Income from research and development (three-year average)	Mean: 7,311,319 €	Increase by 25% from initial level	14,052,922 € Increase by 92% from initial level
Students' satisfaction with curriculum, average grade awarded to courses in Study Information System ÕIS	-	≥4.0	4.0
Curricula taught in English	2	3	4
Share of international students in total number of students, incl. exchange students	5.6%	≥12%	11.5%
Modules taught in English per semester	130 non-module English taught subjects	≥ 1	English taught subjects comprise at least 5 modules per semester
Decrease in the number of first-year drop-outs	16% (2014/2015 academic year)	≥ 10%	10–15%
Enrolments at the master's level	303	≥ 350	282
Percentage of PhD students who have completed the curriculum within a nominal period (nominal+2 years)	23%	40%	17.2%

In its strategic areas, incl. membership, society and organisation, the University considers significant that 90% of employees are satisfied with the quality of working life (Employee Satisfaction Survey 2020 (*in Estonian*)). The number of companies collaborating with the University has doubled, reputation surveys show an increase in brand recall of the University from 31% to 52%, the principles of the Green University

are taken into account in developing the campus. Further information in Chapter ***3.2. Resources*** and Chapter ***3.12. Service to society***.

The University members were given an overview of the results of the 2016–2020 period, incl. reaching the target levels of the development plan, at the University development symposium "Towards Sustainable Development" on 18.06.2021. The results of the implementation of the action plan 2016–2020 for the Development Plan were approved by the University Council on 22.06.2021.

Strengths, areas for improvement and planned development activities

Strengths	
• Clear goals and objectives have been set for implementing the mission and vision of the University. Chairs based on responsibility areas of academic activity have been established to more effectively combine teaching/studies and research and to empower society-oriented activities • Clear distinction from other Estonian universities, academic activities comprising the issues of sustainable use of primary resources vital for life and preservation of the living environment. The main principles of the bio-, circular and green economy are reflected in teaching and research • The University staff and students as well as external stakeholders are involved in the development of the University strategies, planning the activities and reviewing the results	
Areas for improvement	**Planned activities**
• Election of professors - heads of chairs for chairs currently with the chair-holder	• Working out a recruitment plan, incl. announcing international competitions to hires competent professors-heads of chair

3.2. RESOURCES

3.2.1. Managing human resources

The most important resource of a university is people. The University contributes to the well-being and satisfaction of its membership, to achieve a developing, motivated and unified membership with whom to achieve the objectives of the University. Human resource management, incl. recruitment, development and motivation, is based on the objectives and activities set in the development plan.

As of 31.12.2020, the University has 945 employees with employment contracts (the Rector has a contract for services), of which 478 are in academic positions. The University employees are from 28 countries: 74 foreign staff members, 60 of them in academic positions.

The professional requirements of academic staff and the procedure for filling positions are regulated in Academic Staff Positions in Estonian University of Life Sciences. The regulations concerning academic staff are transparent, they were prepared with involvement of the University members and considering the principles of Code of Conduct for Academic Integrity and equal treatment. Recruitment and selection of academic staff is based on the procedure for filling the academic staff positions, which is in accordance with the Higher Education Act, the Organisation of Research and Development Act and other applicable legislative acts. Competitions for academic positions are public. Recruitment for non-academic positions does not have specific regulations, nevertheless, as a rule, the positions are filled through open competitions. Vacant job advertisements are published in the job search portal CV Keskus, and on the University intranet to facilitate internal applications, and public home page. Announcements of vacant leading positions are published in national daily newspapers.

The University has a functioning **personnel development system** and employee satisfaction is monitored regularly. The University has set the goal that at least 80% of employees are satisfied with the quality of working life. During the last decade, in 2011, 2017 and 2020 three employee satisfaction surveys were conducted. Satisfaction is surveyed in the areas of management, working conditions and information flow, as well as the employees' professional development and self-improvement opportunities. The proportion of employees participating in the survey was 50.1% in 2020 (31.9% in 2017, 39.2% in 2011), which shows the willingness of employees to have a say in staff development and the University management and to contribute to making improvement decisions. Overall satisfaction among employees is high, according to the data of the 2020 survey: 90% of employees were satisfied with their quality of working life (83.6% in 2017, 88.5% in 2011).

Part of the personnel development system is the employee performance review, regulated by the performance review procedure modified in 2021. Employee satisfaction with the quality of working life is further monitored through performance reviews, and the information is used to plan improvement activities. Several online trainings have been conducted with the heads and staff of the chairs and departments in order to make the performance reviews more effective.

The personnel development is coordinated, incl. the mapping of training needs, by the Personnel Department who organises courses and training on the basis of an annual plan accordingly. The plan comprises the staff's need for professional development, which includes professional and didactic self-improvement and the issues identified and agreed upon during performance reviews. Information on the courses and training is published on the intranet, where it is also possible to register for the event. Since 2021, employees receive regular newsletters, informing about in-house and external courses and training, via the internal mailing list. After courses and training, the Personnel Department collects feedback on the organisation of the training and the content as well as further training requests, which is taken into account when working out plans for courses and training. In 2019, within the ASTRA project "Value Chain Based Bioeconomy", a special development program was worked out for the University management, incl. heads of chairs, as part of the staff development system, with the aim of fostering leadership attitudes and developing the competencies and skills necessary for leaders. The courses and training took place at the end of 2019 and at the beginning of 2020, having been attended by a total of 27 senior University staff.

In the last five years, 113 courses and training events with almost 4,300 participants were organised within the framework of the staff development system. The results of the satisfaction survey indicate that employee satisfaction with their professional development and improvement opportunities has increased (**Table 4**), which refers to the effectiveness of the staff development system.

Table 4. Satisfaction of the University employees with opportunities for professional development and improvement in 2011, 2017, 2020 (rated on a 6-point scale, where 1 not at all satisfied…6 very satisfied)

Employee satisfaction rate	2011	2017	2020
Professional development	4.09	3.87	4.36
Professional improvement	4.25	4.04	4.46

Remuneration policies are defined, followed and made available to all employees. Remuneration procedure was updated in 2019. The minimum salary levels and the corresponding minimum salaries were changed in 2020, with the salary of academic staff increasing by 6% on average compared to 2019. The results of the employee satisfaction survey show that over the last ten years, the number of employees at the University who are satisfied with their salary and consider their salary to be fair and in line with their performance has increased (**Table 5**).

Table 5. Satisfaction of the University employees with remuneration in 2011, 2017, 2020 (rated on a 6-point scale, where 1 not at all satisfied…6 very satisfied)

Employee satisfaction rate	2011	2017	2020
Salary	3.52	3.38	3.78
Fair salary	3.63	3.46	3.74
Salary and performance correlation	3.62	3.43	3.80

In order to achieve the objective set in the development plan *to reach the average salary level of four Estonian universities by 2025*, the procedure for remuneration was reviewed again in September 2021.

The University cares about the employees, motivates and recognizes them. The Work organisation rules of the University employees are available and briefed to new employees when they start working. Work organisation at the University is flexible and remote working is allowed. During summer periods from 25 June to 20 August, working hours may be reduced to 3 p.m. and in winter, from 27 to 31 December, employees may be granted days off unless the character of the work does not allow. In addition to the regular annual vacation (28 days), 7 additional days of leave are granted to support staff. Sports opportunities have been created for employees in the University sports building and on campus. Discount rates apply to employees at the University Sports Club. As part of the Green University initiative, there are regular events to promote physical activity for staff and students. The University employees are guaranteed regular health examinations, and there are regulations for compensating employees for expenses related to occupational health.

The University recognises the members who have excelled and made a significant contribution to achieving the University objectives. Recognition of membership is regulated by the Statute of Awards and Recognition of the University, as of 1.01.2021. At the academic ceremony in the festive hall, staff members are recognised and the University recognition medals are awarded. The best intra-university cooperation project, applied research and science popularisation activities; the lecturer of the year, the best continuing education lecturer and the deed of the year are announced, research scholarships to students are awarded. The names of the University staff recognised are published on the University website and journal.

One aspect of the membership satisfaction survey is related to recognition. Even though the employees are generally satisfied with recognition (**Table 6**), there are also indications of areas for improvement. The Personnel Department has initiated and leads amending the recognition methods and a university-wide recognition system. As a result of one of the initiatives, the statute of the colleague prize was drawn up and the first colleague prizes have been awarded. The University has launched various initiatives to develop the organisational culture. May 2021 was the month of appreciative leadership, with employees having the opportunity to highlight, recognise and thank their leader. March is the Mental Health Awareness Month in the University, when attention is paid to the mental health of the employees by organising lectures and workshops.

Table 6. Satisfaction of the University employees with recognition in 2011, 2017, 2020 (rated on a 6-point scale, where 1 not at all satisfied…6 - very satisfied)

Employee satisfaction rate with	2011	2017	2020
Recognition	3.75	3.50	3.87

The results of the employee satisfaction survey show a positive trend in employee satisfaction with the employment relationship with the direct organiser of work, work environment and information flow (**Table 7**).

Table 7. Satisfaction of the University employees with work relationships, work environment and information flow in 2011, 2017, 2020 (rated on a 6-point scale, where 1 not at all satisfied…6 very satisfied)

Employee satisfaction rate with	2011	2017	2020
Work relationships, relationships with the direct organiser of work	4.95	4.99	5.21
Work environment, the work space or room/tools	4.30	4.71	4.83
Information flow	4.33	4.34	4.50

3.2.2. Management of finances

Development of financial and investment policy, incl. the preparation of the University budget, is based on the University development plan, the annual action plans for the development plan, the territorial-spatial development plan and the development plans of the institutes. The principles of preparing, adopting and implementing the budget are set out in the University Council Regulation "Budget Rules of Estonian University of Life Sciences". Procurement of goods, services and construction work is based on the University "Procurement Procedure". The general bases for the use of assets are specified in the "Procedure for Real Estate" and the "Procedure for Possession, Use and Disposal of Movable Property".

Guidelines for preparing the draft budget of the University is provided by the Budget Committee of the University Council, directors of institutes and heads of responsibility areas, considering the requirements established in the development plan, other above-mentioned documents and by the Rector. The draft budget is prepared by the Department of Finance and submitted to the Budget Committee and the Senate. The Rector submits the draft consolidated budget with the position of the Senate to the Council for the approval. The annual report on the implementation of the budget for the past year is also approved by the University Council. The financial plan of the University for the next four years is prepared in accordance with the procedure established by the State Budget Act. The Ministry of Finance of the Republic of Estonia monitors the implementation of the University financial plan.

The annual report is prepared in accordance with the Estonian financial reporting standard. Accounting and financial reporting of the University is carried out according to the Rector's directive "Internal Accounting Rules of Estonian University of Life Sciences". Accounting is organised by the Department of Finance of the University. Annual reports are audited by an internationally recognised audit company and approved by the University Council.

Internal control over financial resources is performed on several levels. Heads of units monitor the implementation of their unit and sub-unit budgets on the intranet on a daily basis. Department of Finance monitors overall financial discipline on a monthly basis by displaying summary reports on the University budget implementation on the intranet. The University Audit Committee monitors the targeted use of the University funds. The Senate adopted the "Notification procedure for declaration of related stakeholders and prevention, identification and elimination of conflicts of interests and cases of corruption" at the beginning of 2020. At the end of 2020, two internal audits were conducted: "Related party transactions and declaration of conflict of interest in EMÜ" and "Relevance and efficiency of the cost invoices acceptance process". The common objective of the audits was, among other things, to analyse whether the procedures support the responsibility of the heads of structural units and project leaders for using the financial resources and, on the other hand, enable to reduce the administrative burden. The audits revealed that managing the University financial resources supports the cost-effective organisation of the University core activities.

Budget of the University consists of a main budget and a capital budget. The main budget consists of sub-budgets of the structural units. Revenue to the main budget consists of revenue from educational activities, research and development and the sales of goods and services. The costs of the main budget are the costs of the academic structural units and support structural units of the University, the costs and membership fees of all-university projects, the costs of reserve funds and allocations to the capital budget. Revenues from the main budget have increased in 2016–2020, expenditures have remained stable.

The revenue (**Figure 3**) increased by more than 27% in 2016–2020 (28,052 thousand euros in 2016; 36,012 thousand euros in 2020). Proportionally revenues from research have increased the most (47%), revenues from sales of goods and services have increased by 31% and from educational activities by 11%. The modest increase in revenue from educational activities is due to the slow growth of the state-allocated activity support, which is less than 2%, while the revenue from providing other university-related study contracts and paid formal and continuing education has increased by 63%. Different types of revenue support the quality of tertiary education.

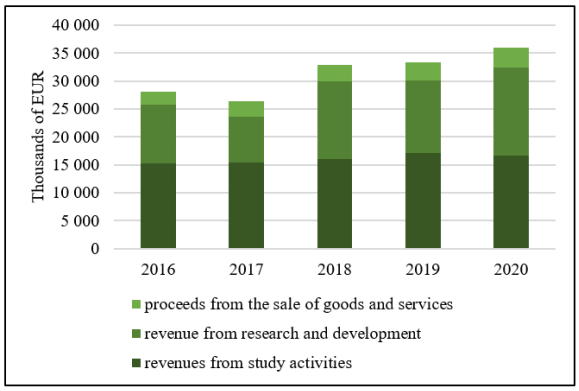

Figure 3. Main budget revenue 2016–2020.

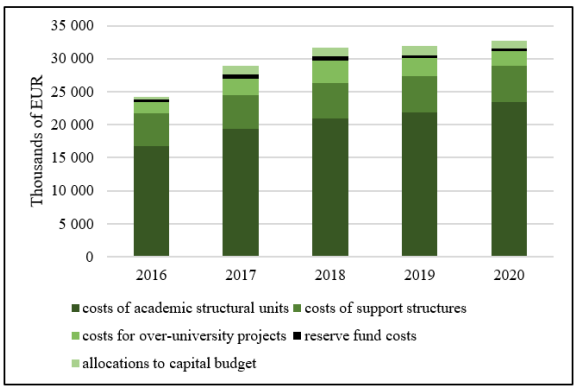

Figure 4. University expenses 2016–2020.

Of the University expenditure in 2020 (32,767 thousand euros) (**Figure 4**), 74% was for academic units, 9% support unit units, 8% property management costs and 9% over-university projects and reserve funds. The costs of academic units have increased proportionally by 4% in 2016–2020 and other costs mentioned above have decreased equally.

3.2.3. Academic and research infrastructure

The development of the University infrastructure is based on the Territorial-Spatial Development Plan (*in Estonian*), which is updated at least once a calendar year, when the capital budget is prepared. The capital budget comprises the resources needed to develop the academic and research infrastructure. The Director of Estates is responsible for preparing the capital budget and for implementing it. In 2016–2020, no large-scale investments were made in the University facilities, the annual investments in the facilities make up approximately 2% of the total budget. The University has excellent laboratories for teaching/studies and research. Investments in IT systems and research equipment are 4-7% of the main budget costs, depending on a specific year, to ensure an up-to-date working environment (**Figure 5**).

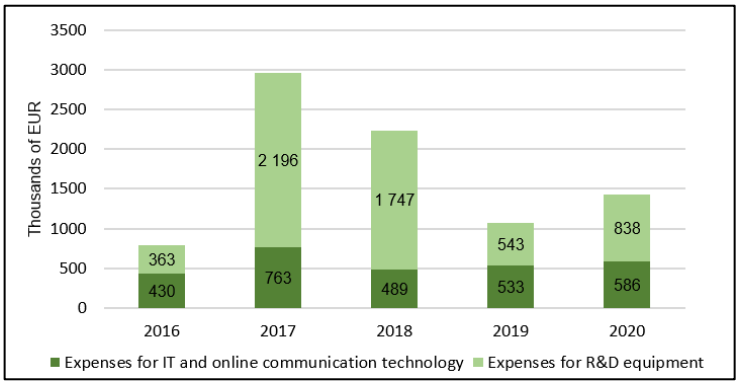

Figure 5. Investments in IT systems and research equipment in 2016–2020.

Besides research projects, research equipment is needed in educational activities and for business contracts, modernising equipment is supported from the University depreciation fund. When needed, the funds of the Rector's reserve are also used to acquire equipment that is important and resource-intensive. As of 2021, the development plan comprises substantial investments in study and research facilities.

Developing and upgrading the **IT systems** is based on expediency and financial profitability. The systems used at the University, incl. study information (ÕIS), financial information, personnel management, document management and account management systems, and their integration have significantly improved data and document management, paper-free administration and management of internal and external communications. The University website is being updated. Various technological solutions for distance working, web conferences and hybrid learning have been developed to deal with the crisis caused by the COVID-19 pandemic. Computer labs are in the process of virtualisation, which will give students more opportunities to use the University IT resources any time and if necessary, for distance learning. Information technology systems and services are regulated by the procedure for information technology services and complies with the requirements of the EU General Data Protection Regulation (GDPR).

University Library supports researchers in archiving databases, assigning DOIs (Digital Object Identifiers), managing research data, and data management plans. The library provides the necessary information for study, research and development; stores and makes available paper and e-documents and publications, and provides public library and information services. The best possible availability of information from collections and access to electronic databases and e-publications is ensured. Publications are procured according to the needs of the academic units.

The library uses the e-catalogue of the integrated library system ESTER and the database of Estonian articles ISE (*Index Scriptorum Estoniae*). The e-catalogue comprises 70% of the publications in the library and the books obtained by the University structural units. EMU DSpace digital archive is available to store the University research work and data. Information about the library resources and services is displayed on the library website.

As of 01.01.2021 the library has 189,436 books and 9,131 research papers. The staff and students have access to the database of 19 journals and two of e-books. 57 scientific journals in foreign languages and 87 newspapers/journals in Estonian are subscribed to from periodicals. To increase the availability of recent scientific information, various trial periods for e-databases and data sets are organised. The search, use and management of digital resources is facilitated by EBSCO Discovery and EBSCO Full text Finder, which provide access to approximately 500,000 e-books and 40,000 e-journals. The reference management software and the plagiarism detection system Ouriginal (formerly URKUND) are available.

The library organises courses and training (incl. instruction in English) for academic staff, research fellows and students on the use of the library resources, digital competences, information retrieval and referencing. The level and effectiveness of the library and information services are evaluated regularly, the results are used for developing services, e.g. the share of e-documents has been increased, a parcel locker has been purchased for contactless lending and return of publications. In addition, the library organises regular displays of books and items of art.

3.2.4. Marketing and communication management

Marketing and communication management supports achieving the goals set in the University development plan. Marketing and communication management is coordinated by the Department of Marketing and Communication in collaboration with other structural units, the University's media partners and stakeholders.

The official information channels of the University **internal communication** are the e-mail, intranet, study information system (ÕIS) and document register. In addition, information is disseminated on the internal screens of the University buildings and social media channels (Facebook, Instagram, LinkedIn). Specific mailing lists have been created for target groups and for different types of information. All the University staff have been included in the mailing list for general and relevant information about the University life (key decisions and regulations, Covid-19 announcements, work organisation, courses and training, etc.). Student life information is provided to students through the mailing list maintained by the Student Union. Study information is available in the study information system (ÕIS). Persons with an official connection with the University have the University e-mail address and a user account, which ensures access to the University information systems. Distribution of information to and between alumni is organised by the Alumni Association via the respective mailing list and social media channel (Facebook).

The University intranet comprises information necessary for the daily work of employees: instructions and documents, booking the premises, information on valid public procurements, management daily schedules, marketing material and other information concerning internal work organisation. Documents and information are managed in the University document management system; the study information system ÕIS is for exchanging information on the organisation of studies.

Information aimed at public and community, incl. scientific news, events at the University, expert assessments, etc., are distributed in press releases, on the University website in the news section, social media and *via* advertising. The most important communication channels are the University website and the press list of the e-mail addresses of Estonian media channels. The most relevant scientific news is disseminated by the Estonian Research Information System (ETIS) and Novaator. International dissemination of news is organised *via* the University web page in English and the portals Research in Estonia and Eurek Alert. The University uses the social media channels Facebook, Instagram and LinkedIn. Nearly 12,000 people follow the University activities on Facebook, more than 2,300 on Instagram and 1,800 on LinkedIn.

The University website comprises the most important documents of public interest and information about events, news, job advertisements, procurements, etc. The website provides staff contacts, collaboration offers for schools and businesses, and research directions. The website is the most important source for admission information. According to the 2020 survey to applicants, 95.4% of the respondents received information from the University website. The relevance of the website in obtaining information is proved by the number of visits, which according to *Google Analytics* was 166,191 as of 20.08.2021 (174,773 in 2020 and 173,147 in 2019).

The objective of **marketing** is to maintain the University's favourable reputation and identity in the society, to foster the sense of unity within the University and to increase the University's popularity in Estonia and abroad with the aim of attracting the best and motivated candidates to study, work and conduct research here. The University participates in numerous research and educational events to disseminate knowledge and popularise the activities. The University organises thematic events, conferences and political debates. The University experts are involved in developing national strategies in areas where the University has a high level of thorough knowledge. The University green initiative working group Green University promotes sustainable thinking in the University and in society. The University participates in reputation surveys and the *International Student Barometer* survey with the aim of planning marketing campaigns. Recent reputation surveys show an increase in the University brand recall from 31% to 52%.

Strengths, areas for improvement and planned development activities

Strengths	
• People's openness to collaboration and innovation • High employee satisfaction, incl. with employment relationships, direct organiser of work, information flow and work environment • Various continuing education courses and training organised for staff • Modern infrastructure up to requirements, incl. laboratory base, laboratory equipment, field test bases; compact campus • Regardless of the effects of the external environment, the University economic activities have been successful	
Areas for improvement	**Planned activities**
• Remuneration according to objectives of the development plan • Extension of employee recognition possibilities • Website functionality	• Remuneration system modification • Further development of employee recognition system • Upgrading the website, incl. the intranet

3.3. QUALITY CULTURE

The University follows the principles of quality management and promotes quality culture to achieve the objectives. The principles of quality management (**Figure 6**) have been established by the Rector's directive "Estonian University of Life Sciences quality management system".

The University processes are defined, targeted and regulated; the principles of process-based management are followed in planning, implementation and improvement of activities. Quality management is based on regular monitoring, measurement, analysis and evaluation of processes and the achieved results, as well as continuous improvement based on the needs and expectations of the stakeholders.

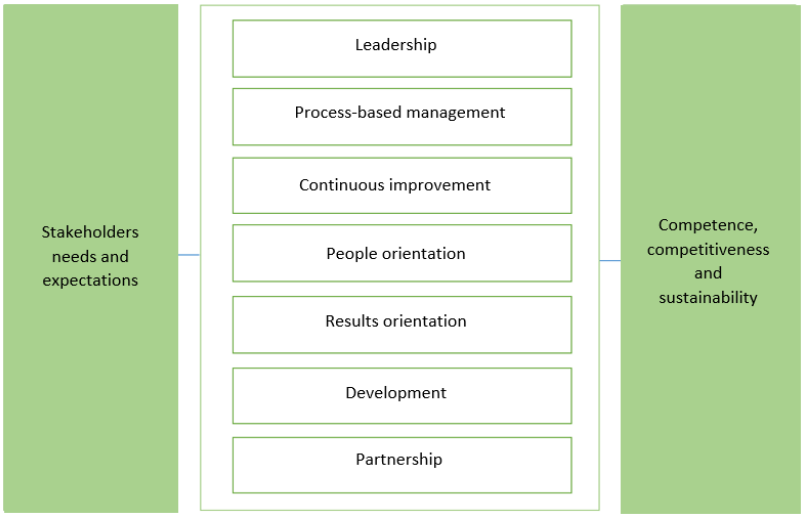

Figure 6. University quality management model and principles.

The University has established its internal quality assessment principles and procedures. The purpose of the University internal evaluation is to ensure the effectiveness and quality of the main processes – research, development and teaching/studies, and to serve the society – to support the University's strategic management, incl. the fulfilment of the objectives set in the University development plan. Internal assessment is carried out according to the regulation of the University Senate regulation "Internal assessment principles for Estonian University of Life Sciences". Internal assessment includes assessment of the University as an institution, regular assessment of the academic activity responsibility areas and curricula, and single internal assessments. Internal evaluation involves the membership of the University, incl. students, and external stakeholders.

The University emphasises curriculum development and established new requirements for the content and structure of curricula in 2018. As a result, all curricula of the University have been updated and modernised, the learning outcomes of the curricula and subjects have appropriate and clear objectives, the subjects learning outcomes are related to the objectives and learning outcomes of the curricula. Regular assessment of the objectives and quality of curricula and the effectiveness of educational activities was implemented

at the University in 2021. Appropriate assessment forms have been established to assess the relevance of subjects and curricula, whether they are up to date; and the compliance with internal and external quality indicators and requirements. The results of assessments are used as evidence-based input in curriculum development. Internal curriculum evaluation is regulated by "Procedure for Internal Curriculum Evaluation in Estonian University of Life Sciences" and the process is carried out in the document management system.

The compliance of the University management, work organisation, teaching/studies and research, and the study and research environment with legislation and the University objectives and development plan is also assessed by external assessment, which includes institutional assessment of selected curricula, thematic assessment and research evaluation. In addition to mandatory external assessments, the University participates in various quality assessment projects on its own initiative. In 2021 the Institute of Economics and Social Sciences participated in a project coordinated by the Education and Youth Board, "Recognition of practice as process" *(in Estonian)* and was awarded the corresponding quality label.

The results of all internal assessments of the University are the basis for improvement and development activities of the University. **Table 8** gives examples of improvement areas mapped and implemented during internal assessments of the University in 2017–2021.

Table 8. Improvement areas mapped and implemented during internal assessments of the University in 2017–2021

Improvement areas mapped	Planned and implemented activities (as of November 2021)
Closer collaboration within and outside the University to create and deliver increased value	In 2020, functioning of institutes and chairs was analysed, incl. communication and collaboration efficiency. To enhance coherence and synergy within and outside the University, incl. strengthening coherence and synergies of focus areas and teaching/studies and research in academic responsibility areas, Estonian University of Life Sciences will implement a new structure from 1.01.2022 (**Figure 1**). Further information on the new structure in Chapter ***1.3. Management and structure***
Faster implementation and reflection of changes in society in the curricula and learning process	The right to approve specific changes to curricula has been granted to the Senate Committee of Academic Affairs. The Committee meets as needed, but at least once a month. In order to develop curricula, each curriculum has a development committee, which includes an employer's representative as a mandatory member, to ensure that the curriculum meets the needs of the labour market. A module on "Entrepreneurship" was added to curricula; changes in the curricula take into account the results of the monitoring and forecasting system OSKA survey of employees and skills needed, the UN development goals, the goals of the EU Green Transition and the goals of the development plan "Estonia 2035".
Development and implementation of three new English taught curricula (the target set in the development plan for 2025)	Master's degree programs "Agri-Food Business Management" (2019/2020), "Environmental Governance and Adaptation to Climate Change" (2021/2022), "Planning and Analysis in Multifunctional Forestry" (2022/2023), "Rural Community Management" (2022/2023)
Uniform support services for local and international students and staff	In 2019, the City of Tartu, the University of Tartu and Estonian University of Life Sciences established a joint service centre for foreign employees and foreign students, which helps to resolve the issues of persons arriving from abroad, from finding a family doctor (general practitioner) to solving social problems. Support services are available in Estonian and English. Since September 2020, two psychologists work at the University. Access to all University regulations in English has already been partially improved.
Development and implementation of measures to reduce drop-out	An orientation week is organized for first-level students since 2019. Explanation of the curriculum and speciality subjects was introduced earlier in the curriculum. A career specialist, a psychologist and an educational technologist are involved in the course "Introduction to the speciality". In 2021, a second psychologist was hired. A letter of motivation was added to the admission requirements in the food technology curriculum.
Increasing student participation in feedback to subjects and teachers	Students are regularly reminded of the importance of feedback. Students are involved in seminars organised by chair and curriculum leaders, and students' feedback on the curriculum, study process, etc. is discussed within the seminars. Student Union conducts additional feedback surveys among students.
Wider introduction of the University as an institution focused on promotion of bioeconomy	A campaign of thematic articles in Estonian aimed at the society has been launched and media appearances are planned.

To increase the effectiveness of the quality management system and to prevent negative impact, the University regularly conducts risk assessments in accordance with the procedure described in the University risk management and evaluation procedure *(in Estonian)*. The results of risk assessments are an input to the University management decisions.

To involve the University stakeholders in management, processes and development of knowledge services (teaching/studies, research and development) and services related to service of society, and to use the results in improving the University activities, a feedback system is implemented. The feedback system as a process includes feedback planning, planning and implementation of activities, using various feedback methods, control, evaluation and implementing the results, planning improvement activities and implementation of improvement items. Feedback system process is regulated by the University feedback system procedure provisions.

Strengths, areas for improvement and planned development activities

Strengths	
• The University develops quality culture; the University has developed and operates according to the quality management system, incl. an internal assessment system • Functioning feedback system; the University development and improvement decisions are based on feedback and assessment of results	
Areas for improvement	**Planned activities**
• Implementation of internal curriculum assessment process is more resource-intensive than planned (time and human resources) • Further development of the quality system, incl. staff involvement and training	• Training the staff to have the relevant competencies for conducting internal assessment of curricula • Carrying out regular quality trainings and involving staff for further development of the quality management system

3.4. ACADEMIC ETHICS

The University appreciates its membership and ensures following the academic ethics principles of equal treatment to all employees and students. The University adheres to the principles of academic ethics and equal treatment set out in *Magna Charta Universitatum*, the Code of Ethics of Estonian Scientists adopted in 2002 and the Code of Conduct for Research Integrity finalised in 2017 in collaboration of the Estonian Academy of Sciences, the Estonian Research Council, Estonian research institutions and the Ministry of Education and Research.

The basic principles of academic ethics and the procedure for proceedings violations at the University are set out in the Senate Regulation updated in 2020 "Good Academic Practice and Implementation of Principles of Academic Ethics in Estonian University of Life Sciences". For the regulation, the previous regulation was supplemented with standards of conduct to reinforce the basic values and operating principles of research universities, and was agreed upon by the University membership at the seminar "Good practice" on integrity and good academic practice (2.10.2020, 70 employees participated). The regulation describes the system for developing common ethical principles and sharing knowledge in the field of ethics, and sets out the role of the Academic Ethics Committee at the University.

In 2021 the Academic Ethics Committee was established in the University, with the objective of introducing the principles of academic ethics at the University; and to prevent and resolve issues related to misunderstanding or violating principles of academic ethics that have arisen or may arise in the University, by applying the principle of equal treatment. The principles of the work of the Academic Ethics Committee, the organisation of its activities and the proceedings for dealing with a suspected breach or complaint are established to ensure fairness, impartiality and transparency of procedures. The committee consists of staff of various fields and positions of the University, students, and an external member, an ethics advisor of extensive experience from the University of Tartu.

The Senate regulation "Good Academic Practice and Implementation of Principles of Academic Ethics in Estonian University of Life Sciences" is the regulatory basis for the University comprehensive and feedback-based system for promoting academic ethics and addressing issues. Staff and students follow the principles of academic ethics agreed upon. The process for dealing with staff / students' problems / complaints is described and communicated at the University (**Figure 7**).

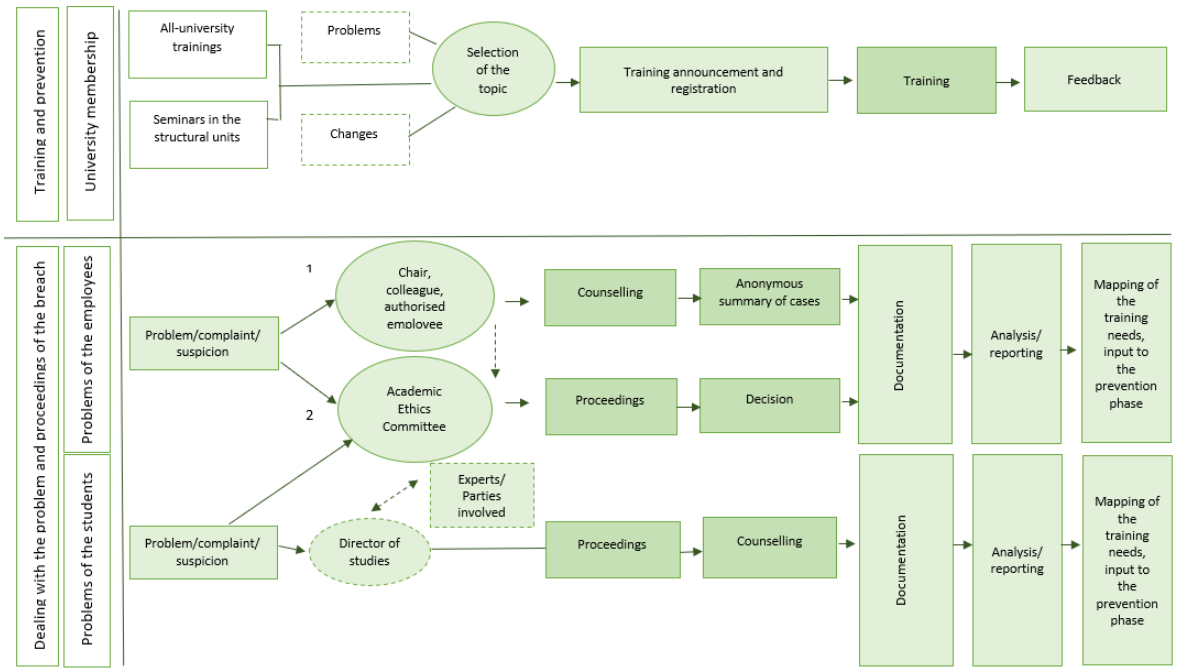

Figure 7. Procedure for academic ethics at the University.

Student issues, incl. discrimination, are dealt with by the institute's director of academic affairs, who advises students and administers complaints. In the last five years, students have submitted 18 written complaints to the directors of academic affairs. The content of the complaints varies and is mostly related to academic demands and requirements by staff and grade appeals (10 complaints). However, the number of grade appeals is decreasing, as the grade criteria are described in more detail than before. Three of the grade appeals were decided in favour of the student. Some student complaints have been related to discrimination based on the customs and behaviour due to different cultural norms and their different interpretations. To better understand cultural differences, the University organises seminars and trainings: in October 2019, a psychological training on cultural varieties for study organisation specialists was held; in April 2021, a seminar for academic staff on culturally sensitive teaching focused on the cultural specifics of the Middle East, North Africa and Arabia, and in October 2021, a seminar on Japanese culture was held.

In order to link the informal and formal information system and ensure effective feedback, the institutes have authorised staff whose role is to advise and support the membership of the institute in resolving issues of academic ethics. To support the collaboration of members of the Academic Ethics Committee and the authorised employees of the institutes in identifying problems of academic ethics and preventing violations, joint courses and trainings have been conducted with the staff of the University of Tartu Ethics Centre.

Prior to 2021, when the Academic Ethics Committee was established, the complaints concerning academic ethics were administered by the Senate Academic Committee. The Committee was submitted problems with academic ethics issues three times in the last five years. On one occasion, advice was sought on supervision at the University of a PhD student who had completed the residency abroad and who wanted to use a research article completed during the residency to obtain a doctorate in philosophy. The second case concerned the interpretation of copyright. The third case concerned the ownership and sharing of research data with colleagues and the perception of intellectual property due to different cultural backgrounds. All cases have been resolved. Cases of violation of academic ethics have been introduced to the University membership, preserving the anonymity of the parties.

The principles of academic ethics are followed in planning research. For animal experiments, the appropriate permit is applied for from the National Board of Animal Experiments of Estonian Ministry of Rural Affairs, and for human research or other research containing personal data, from Research Ethics Committee of the University of Tartu. The University regularly organises training and seminars on intellectual property, incl. copyright (seminar “Copyright in research” in 2018, webinar “Copyright issues at the University” in 2021). Research integrity, copyright, intellectual property, data protection and data management regulations, guidelines and training materials are available on the University website.

A survey conducted in 2021 within the framework of the analysis "Adherence to the Principles and Guidelines of the European Charter for Researchers in Estonian Research and Development Institutions" showed that the University academic staff highly values ethics, transparency and professionalism. The issue to consider and develop further is a systematic explanation of aspects related to ethics and responsibility to academic staff.

In addition to more general ethic dimensions, there are several more specific issues related to academic ethics in educational activities, incl. academic fraud. Issues concerning academic ethics in studies are regulated by Study Regulations, Requirements and Procedure for Awarding PhD Degrees, Requirements and Procedure for Awarding Master's Degree and other documents regulating educational activities. The documents state, as a general principle, that students and staff follow good academic practice, and that errors and fraud against academic ethics are considered unacceptable. The procedure for detecting and processing academic fraud is regulated and ensures fair and equal treatment of all parties.

With information and emphasis on academic ethics, the University aims at ensuring all students and academic staff adhere to the principles of academic ethics, respect each other and prevent the use of academic fraud. Students are explained the issues of academic ethics in the information sessions for first-year students and in the subject "Introduction to the speciality", and later in their speciality seminars. The content of the subject "Introduction to the speciality" is uniform in all curricula (since spring semester of 2020). Academic staff has been informed about the requirement to thoroughly explain the principles of academic ethics and the relevance of academic ethics to students. The basic concepts and principles of research ethics, good academic practice and preventing plagiarism are covered in the first and second level subjects of higher education "Research methodology" and in the PhD curricula, the subjects "Copyright and legal protection of intellectual property" (**Appendix 29**), "Research methodology" (**Appendix 30**) and "Research ethics" (**Appendix 32**). As a preventive measure, the Ouriginal plagiarism detection software has been in use since 2017, which requires thorough collaboration between the lecturer and the student in order to analyse the texts entered into the system. Until 2017, the University used the plagiarism detection system KRATT.

Focus is on the quality of the PhD and graduation theses, and equal and fair treatment of the defence procedure. Dissertation defences are saved as audio or video files and stored in the document management system in case the need arises to identify errors in the defence procedure. Reviews of the University dissertations are stored in the library archives DSpace, with electronic dissertations; the reviews are not published.

The number of cases of academic fraud by students at the University in the last five years was 17, two of which have not been confirmed. Cases of academic fraud are mostly related to using unauthorised aids in pass/fail exams or graded exams. The number of cases of plagiarism of final theses (**Table 9**) was 4, for one of them the suspicion of plagiarism was not confirmed. In three cases, the theses were not approved for defence, and in 2017, the academic degree had to be cancelled in one case. In general, the ethical awareness of students and staff has risen, as evidenced by the decline in the number of cases of academic fraud. Somewhat more academic fraud could occur in connection with distance learning due to the COVID-19 pandemic (5 cases were detected in 2020/2021), while implementation and active use of the plagiarism detection system has certainly contributed to reduction of plagiarism (**Table 9**).

Table 9. Statistics related to plagiarism detection at EMÜ for the academic years 2016/2017–2020/2021

	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021
Number of cases of plagiarism detected during the defence of theses	1	2	N/A	N/A	1
Number of academic staff using Ouriginal (Urkund) (since 2017)	N/A*	11	111	112	155
Number of written papers checked with Ouriginal (Urkund)	N/A*	88	997	1071	1478**

**data cannot be provided as KRATT does not release usage statistics*
***date 22.10.2021*

Submission and processing complaints is provided for by the Rector's Directive "Procedure for processing proposals and complaints" (20.04.2020), which covers harassment, work related harassment and

discrimination alongside issues related to work organisation, occupational safety, corruption, misuse of University property, etc. The procedure does not apply to complaints, the regulation of which is established in the documents concerning studies, and in the procedure for applying the principles of academic ethics. Since implementing the proposals and complaints procedure, no cases of discrimination or other issues have been submitted at the University on the basis of this procedure. In 2016–2020, one case of work-related harassment was identified at the University, where the decision was made in favour of the employee who submitted the complaint. Two cases were about terminating the employment relationship of the PhD student's supervisor, due to which the suggested solutions were not suitable for the PhD students. In the third case, the PhD student did not follow what was agreed in the individual plan and was not ready for new agreements. In all three cases, the PhD students left the University.

The University pays more attention than before to promotion of gender equality in the University. The gender balance in decision-making bodies and professorships, as well as the pay gap between men and women, need to be improved. The University developed an action plan on gender equality, in the autumn of 2021.

Strengths, areas for improvement and planned development activities

Strengths	
• Academic Ethics Committee with the authorised staff of the institutes form a network that contributes to following the principles of academic ethics by the University membership • Documents regulating organisation of studies and conducting studies include systematic approach to issues of academic ethics • The University has established a comprehensive feedback-based system for promoting academic ethics and addressing possible issues	
Areas for improvement	**Planned activities**
• More effective awareness and implementation of academic ethics aspects, incl. the principles of equal treatment and gender equality, in the membership	• Analysis of issues submitted to Academic Ethics Committee and authorised staff of the Institutes. Organising seminars for membership to better understand and implement the principles of academic ethics, incl. equal treatment and gender equality

3.5. INTERNATIONALISATION

The objective of the University is to carry out high-level research and development in all fields of sustainable use of natural resources, rural life and rural economy, and to develop into an internationally recognised research university in the field of bioeconomy. The engine to foster the University development is internationally competitive research and development as a foundation for teaching/studies at all levels of higher education, and activities that promote the development of society in its responsibility areas. The opening of curricula taught in English, growth in the number of international lecturers, researchers and exchange students, and success in applying for international cooperation projects have helped to improve the international recognition of the University. The goals and objectives of teaching/studies, research and development related to internationalisation are established in the University development plan and in the administrative agreement concluded with the Estonian Ministry of Education and Research. Fulfilment of the set goals and objectives is monitored; the activities and results are regularly reflected in the annual report of the University and in the report submitted to the ministry at the end of the administrative contract period.

The University is culturally open globally, teaching and research collaboration is based on the University areas of activity, previous collaboration and the requirements established for projects. Previously successful collaboration projects are generally the basis for continuing collaboration. E.g. the partners of ISQAPER project (2015–2020) are also participating in the new MINAGRIS project (2021–2026). ERASMUS+ strategic cooperation project EduSapMan (2014–2017) was followed by INTASEK project (2017–2020) and a new project application is being prepared.

Research and study contracts help to meet the objectives set for mobility. In 2016–2020, 122 international research contracts were signed and 23 ERASMUS+ strategic collaboration and capacity building projects were implemented. As of June 2021, the University has 320 student and teacher exchange partnership agreements worldwide, of which 294 were Erasmus+ intra-European mobility agreements. Staff and PhD

students can use the funds of the ASTRA program measure for professional development abroad. The University has the largest number of partners in Germany, Poland, France and Turkey, and in the Russian Federation outside the European Union. Popular destinations among the University students are Finland, Portugal, the Netherlands; and among staff, Latvia, Portugal and Finland. Jordan, Albania and Mexico have been added as partners in the ERAMUS+ Global Mobility Program.

Student mobility

The University promotes and supports international student exchange. International students can study in English taught curricula and choose study modules taught in English. On the basis of higher education institutions or international agreements, the University offers Estonian students opportunities for study mobility with the help of scholarships from various programs and foundations. Activities related to international student mobility are regulated in Study Regulations. For foreign universities, Terms and Procedure for Recognition of Prior Learning and Work Experience and Transferring of Study Results meets the quality requirements established at the University, is systematic and in line with the learning outcomes, and supports student mobility.

The University encourages students to participate in international student exchange. Students are informed and aware of various scholarship programs and opportunities to study abroad, incl. internships. They are thoroughly advised and assisted, incl. for preparing various applications. Students who have already studied abroad are involved in promoting learning mobility, thus inspiring fellow students with their experience. To support study mobility, the University develops students' English language skills by offering at least one speciality related subject with English as the language of instruction in addition to the subject "English for specific purposes" during the academic studies in Estonian taught curricula. In order to facilitate study mobility, so-called mobility windows have been created in the curricula. For example, the bachelor's degree program in engineering and technology includes subjects that can be taken outside the home University (subjects without prerequisites, optional subjects and practical subjects) in the spring semester of the second year. For study mobility, the choice of subjects and their suitability for the curriculum is thoroughly advised, which ensures comfortable and smooth study mobility and its recognition in the completion of the curriculum. In recent years, the average number of ECTS per study visit has increased from 12 ECTS (2016) to 20 ECTS (2020), which shows that more time is spent in mobility, even though more than half of our student mobility are still shorter than 90 days. Mobility is increasingly used for practical training. In recent years, mobility has decreased to some extent (**Figure 8** and **Figure 9**) due to circumstances beyond the University (the COVID-19 pandemic that broke in 2020). In 2020, the University had visiting students from 32 countries, most of them from Germany, France, Poland and Portugal. More than half of the foreign guest students come to Estonia for a period longer than 90 days (**Figure 9**).

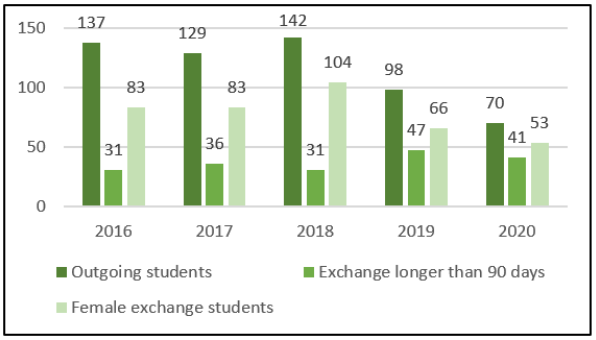

Figure 8. Students studying abroad 2017–2020.

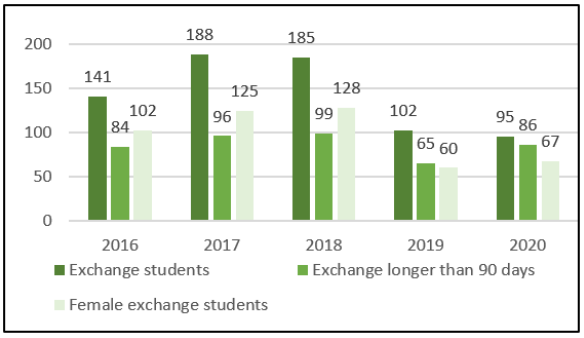

Figure 9. Foreign guest students 2016–2020.

Opening English taught curricula at the University has contributed to international mobility. English taught master's curriculum "Agri-food business management" was opened in 2019 and "Environmental governance and adaptation to climate change" in 2021. English taught master's curricula "Forestry Planning and Analysis" and "Rural Community Development" will be opened for 2022/2023 admissions. An international joint curriculum in ergonomics is being developed. The PhD curricula of the University are taught in Estonian and English. The first English taught curricula at the University, opened in 2013, "Veterinary Medicine" for veterinary studies and Landscape Architecture for master's studies are still

popular, as the competition for these curricula is significant. New English taught curricula increased the English taught subjects number – in 2020, students could choose from 264 subjects.

The number of foreign students in formal education has increased from 219 in 2016 to 284 in 2020 (**Figure 10**) and the percentage of foreign students in the total number of University students has increased from 6.7% to 9.6%, which, as a total with foreign guest students included, makes 11–15 % (11% in 2016, 13.5% in 2017, 15.2% in 2018, 13.3% in 2019 and 12.8% in 2020). The number of foreign PhD students has increased from 36 to 57, comprising 16% and 25% of the total number of PhD students, respectively. E.g. in 2020, half of the students in the PhD curricula in environmental science and applied biology were foreign students.

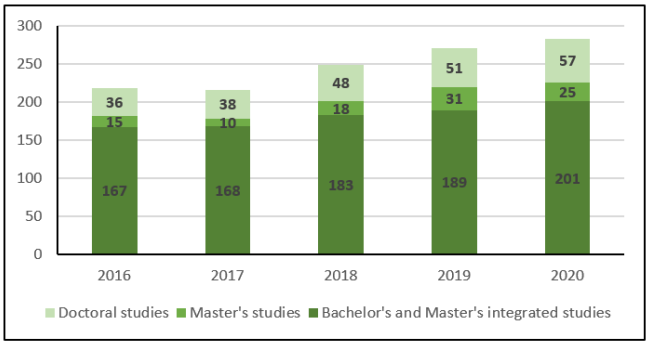

Figure 10. Number of foreign students 2016–2020.

Foreign students have the opportunity to study Estonian as a foreign language and Estonian culture, 6 ECTS, in the curriculum. PhD students have the opportunity to study Estonian as a foreign language as an optional subject. When studying Estonian as a foreign language, optional subject, there are no volume restrictions at any study level.

In their feedback, foreign PhD students and other foreign students have pointed out that one of the relevant reasons for continuing their studies in Estonian University of Life Sciences is the very good level of research infrastructure (equipment, laboratories) and the international level of research, as well as the compact campus that fosters collaboration, and comfortable dormitories where places are available for everyone.

Staff mobility

The University supports and promotes international mobility of staff. Mobility is used for professional development, internships, participation in conferences and seminars, collaboration, teaching/studies and research. Staff mobility has increased in 2016–2019, accordingly the number of business trips abroad (**Figure 11**) and the number of employees on business trips, incl. academic staff (**Figure 12**), has increased.

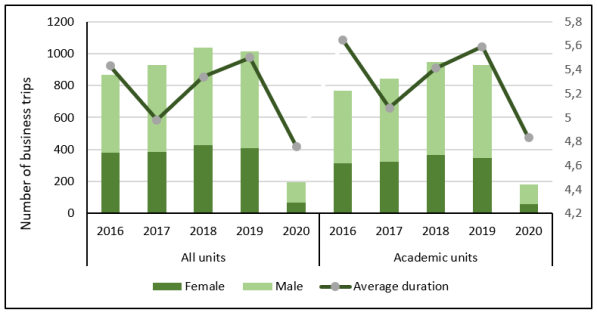

Figure 11. Foreign business trips, number and duration of business trips; 2016–2020.

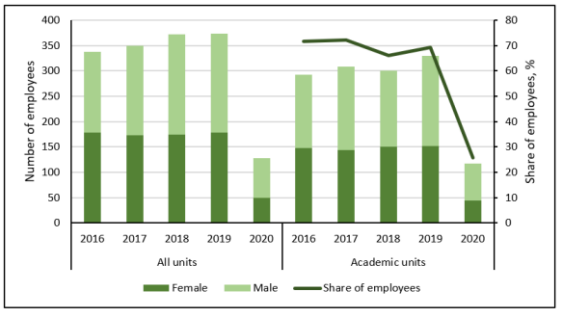

Figure 12. Number of academic staff on foreign business trips; share of academic staff participating in business trips; 2016–2020.

Each academic staff member has been on a business trip abroad at least once during this period, so the average number of business trips per person was 2.6–2.7 times a year. The share of business trips of female and male employees is 40% and 60%, respectively. 89-94% of all business trips are taken by academic staff. 50–60% of the business trips of academic staff are related to teaching/studies and research;

conferences, etc. participation and professional development. The number of teaching/studies related business trips has also increased (until 2020, **Figure 13**).

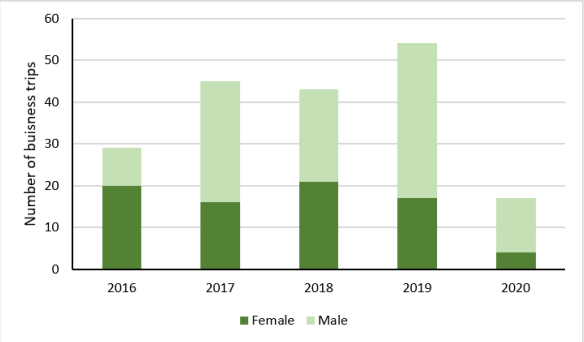

Figure 13. Number of teaching/studies related business trips 2016– 2020.

As of 31.12.2020, there were 74 foreign staff members who were not Estonian citizens and not staying in Estonia on the basis of a long-term residence permit nor permanent right of residence (**Table 1**), 60 of whom (12.3%) worked in academic positions. The University development plan objective by 2020 was to achieve a percentage of foreign employees of at least 10% of all academic staff. The increase in the number of foreign staff has been facilitated by open international competitions, international collaboration links, the financial support from ASTRA measure and the launch of two ERA Chairs. Various measures, incl. the ERASMUS and ASTRA projects, involve foreign lecturers in teaching/studies of the University: in 2016–2020, 95 foreign lecturers were involved in the ERASMUS project and 53 in the ASTRA project. Foreign visiting lecturers also work as supervisors and consultants for PhD students; in 2016–2021, 46 (12%) PhD dissertations were co-supervised by lecturers from foreign universities. In 2017–2021, the University participated in the Marie Skłodowska-Curie Action European Joint Doctorate Innovative Training Network (EJD ITN) project MANTEL (*Management of Climatic Extreme Events in Lakes & Reservoirs for the Protection of Ecosystem Services*), which involved 12 foreign PhD students from the University. In 2021, the two foreign PhD students who participated in the project defended their PhD dissertations according to a joint doctoral dissertation agreement between Estonian University of Life Sciences and the University of Barcelona. These were the first dissertations defended before the joint committee of Estonian University of Life Sciences and a foreign university.

Support to internationalisation

Foreign students and foreign staff are supported and advised in the Department of Academic Affairs and Personnel Department and in the institutes. Support students or buddies provide support for foreign students. Further information on the support system for foreign students and foreign guest students in Chapter ***3.10. Study support systems***. To support the integration of foreign students and foreign staff in the local life and at the University, International Club was established at the University in 2011. In co-operation with the Tartu Municipality and the University of Tartu, MTÜ Tartu Welcome Centre was established in 2019, which also supports a smoother integration of foreigners into Estonian society.

The University offers various courses and training to support staff and students in multicultural work environment to facilitate smoother integration and encourage collaboration. E.g. a series of events introducing cultures and nationalities to staff was launched in 2019. The University Language Centre regularly offers the staff courses of English and Estonian as a foreign language; the administration procedures of the University, incl. the necessary information for a new employee and the most relevant documentation concerning the University, are bilingual.

The University supports and values the contribution of staff and students to internationalisation of the University. One of the components in planning the financial resources of the units is the internationalisation indicator (e.g. the volume of teaching/studies for foreign students). Staff participation in international projects is supported by financing projects' self-financing and project applications. Tutors of foreign (visiting) students are recognised with financial remuneration.

Strengths, areas for improvement and planned development activities

Strengths	
• Efficient and well-functioning support system for foreign (visiting) students • Global collaboration networks for student exchange and joint projects • High-quality infrastructure and a compact campus attractive to foreign researchers and PhD students	
Areas for improvement	**Planned activities**
• Improving student's competence in English for specific purposes • More effective integration of foreign staff and students into the daily life and the information systems of the University • Developing support systems for foreign staff in structural units	• Ensuring bilingual information, information systems and documents, improving the availability of information at the University • Development of a support system for foreign staff, incl. staff training in institutes and chairs; development of a mentoring system for foreign staff • Teaching at least one subject in English to improve students' professional English for specific purposes skills

3.6. ACADEMIC STAFF

The University offers science and knowledge-based education in accordance with the Standard of Higher Education *(in Estonian)* at three levels of higher education. As of 31.12.2020, the University had a total of 45 curricula, incl. 5 PhD, 19 master's, 2 civil engineering, 2 veterinary, 15 bachelor's and 2 professional higher education curricula.

Academic staff: age structure and qualifications

To achieve the objectives and learning outcomes of curricula, the University has lecturers/university teachers with the corresponding qualifications (academic staff, according to the Higher Education Act). Academic staff are persons whose employment duties comprise either teaching or research, development or creative activities at the level of higher education, or both, according to the Higher Education Act (in force from 1.09.2019). This is a common definition of an academic staff member, the legislation no longer specifies the positions of lecturers and researchers. Instead of the previous five positions of university teachers (professor, associate professor/docent, lecturer, assistant, teacher) and four positions of researchers (leading researcher, senior researcher, researcher, junior researcher), the University now has the following academic staff positions: professor, lecturer, research fellow, teacher. The requirements for academic staff positions, the methods and procedure for filling academic positions and the procedure for assessing the performance of academic staff were established by the Senate Regulation "Academic Staff Positions in Estonian University of Life Sciences", as of 27.02.2020. Annex 1 "Academic Career Model" of the Senate regulation provides an overview of the positions and grades of academic career or the career path.

The number and age structure of academic staff is relevant for the sustainability of teaching/studies. As of 31.12.2020, the number of academic staff was 488 and their average age was 47 (**Table 10**).

Table 10. Number and age structure of academic staff per positions (as of 31.12.2020)

Position title	Academic staff	Average age
Professor	42	57
Associate professor	5	48
Assistant professor	0	0
Docent*	47	51
Research fellow	78	43
Senior research fellow	46	54
Junior research fellow	71	36
Research professor*	2	65
Lecturer (incl. senior lecturer, assistant*)	187	49
Teacher	10	50
Total/Average	**488**	**47**

** positions before the regulation 27.02.2020, which will disappear after evaluation as provided for in the Universities Act*

According to calculated full-time equivalents, the number of students per academic staff member in the University (EMÜ) is 9.1 (2020), which is comparable to the corresponding indicator of the other two largest Estonian universities - the University of Tartu (TÜ) and Tallinn University of Technology (TTÜ) (**Table 11**).

Table 11. Number of students per academic staff member calculated in full-time equivalents 2016–2020 (TTÜ – Tallinn University of Technology, TÜ – University of Tartu, TLÜ – Tallinn University)

	2016	2017	2018	2019	2020
EMÜ	9.6	8.4	8.8	8.6	9.1
TTÜ	14	14.2	13.6	10.4	10
TÜ	10.3	10.1	10.1	10.6	10.3
TLÜ	23.3	24.8	23.2	22.7	21.3

The age group up to 35 years makes up 23% of the number of academic staff, the age group 36–45 years 29%, the age group 46–55 years 22%, the age group 56–65 years 16% and the age group 66 and older 11%. Age distribution of academic staff is presented in **Table 12**. Considering that senior research fellows and leading researchers are involved in teaching as supervisors, the distribution of 371 teaching-related staff is as follows: up to 45 years 64%, aged 46–65 years 25%, and aged 66 years and older 11%.

Research-based studies are ensured by professionally competent and highly qualified academic staff. More than 2/3 of research fellows (197) are involved in educational activities. The number of academic staff with a PhD degree or a corresponding qualification (hereinafter: PhD degree) was 267 as of 31.12.2020 (**Table 12**). 71 junior research fellows were in the process of completing their PhD studies. The percentage of academic staff with PhD (excl. junior research fellows) is 64%, which is a 15% increase compared to 2019, the year of the previous institutional accreditation. 45% of academic staff (excl. junior research fellows) up to the age of 35, 65.3% aged 36–45, 62.7% aged 46–55, 70.5% aged 56–65 and aged 66 and over 73 .6% have a PhD degree. Over the last five years, the percentage of academic staff with PhD degrees has increased, especially in the age group up to 35 years. From 17.6% in 2016, the percentage of the age group increased to 48% by the end of 2020.

Table 12. Age distribution of academic staff, incl. staff with PhD 2016–2020

Year	Academic staff	Incl. PhD[1,2]	Share of PhD[1,2] (%)	Age up to 35		Age 36–45		Age 46–55		Age 56–65		Age 66 and older	
				Share[1] (%)	Incl. PhD[1,2,3] (%)	Share[1] (%)	Incl. PhD[1,2,3] (%)	Share[1] (%)	Incl. PhD[1,2,3] (%)	Share[1] (%)	Incl. PhD[1,2,3] (%)	Share[1] (%)	Incl. PhD[1,2,3] (%)
2016	435	217	49,9	24,8	17,6	29,7	64,8	20,0	69,0	16,3	59,2	9,2	62,5
2017	459	245	53,4	24,8	41,8	29,2	60,5	19,6	73,3	17,2	62,8	9,2	71,4
2018	486	253	52,1	25,1	42,0	29,4	60,9	19,1	66,3	17,3	66,3	8,8	72,1
2019	503	263	52,3	24,7	47,7	30,2	66,7	18,9	63,3	15,5	64,9	10,3	65,4
2020	**488**	**267**	**54,7**	**22,5**	**45,0**	**28,9**	**65,3**	**21,5**	**62,7**	**16,2**	**70,5**	**10,9**	**73,6**

[1]All academic positions; [2]PhD or equivalent position; [3]excl. junior research fellows

In 2016–2020, the number of academic staff with PhD degrees in the main responsibility areas and technical fields of the University has significantly increased. Of the 85 doctors who defended their PhD thesis during this period, 51 (60%) continue their academic careers at the University. Academic succession has improved most in forestry, agriculture, veterinary and food sciences, and engineering sciences. Since 2016, 75% of PhD graduates have started working at the University in the field of forestry; 40% in agriculture; 75% in veterinary medicine and food science and 88% in engineering sciences. The share of academic staff with PhD degrees in the first level of higher education is 52%, in the second level of higher education 67%, and in the third level of higher education 100%.

The University requirement is, that from 01.01.2020 only staff with PhD degree or an equivalent qualification can apply for the position of a lecturer. Lecturers previously employed without a PhD degree must meet this qualification requirement by the time of their evaluation in order to continue in the position. A lecturer with whom an employment contract was concluded for an indefinite period after 1.01.2015 and who does not have a research degree or a corresponding qualification, but who is in PhD studies, has the right to continue working as a lecturer until the end of PhD studies. Over the last five years, the percentage of lecturers with PhD degrees has increased. From 21% in 2016, the percentage of lecturers with PhD degrees increased to 33% by 2020 (**Table 13**).

Table 13. Proportion of lecturers with PhD by age 2016–2020

Year	Lecturers	Incl. PhD[2]	Share of PhD[2] (%)	Share of PhD[2] (%)				
				Age up to 35	Age 36–45	Age 46–55	Age 56–65	Age 66 and older
2016	162	35	21,6	21,1	25,0	27,3	12,5	13,3
2017	165	43	26,1	23,5	19,2	37,1	18,5	41,2
2018	163	45	27,6	22,2	19,6	28,9	33,3	47,1
2019	168	49	29,2	20,8	27,8	26,3	36,7	36,4
2020	**166**	**55**	**33,1**	**31,8**	**28,0**	**26,7**	**40,7**	**50,0**

[2]*PhD or equivalent qualification*

To increase the number of PhD dissertation defences, the University is implementing several measures: the admission conditions for PhD studies have been expanded, PhD studies can be funded from the baseline funding of the structural unit, academic staff are given a sabbatical leave for conducting research, PhD curricula are more flexible, and evaluations are focused to the progress of research, fulfilment of the annual compulsory study load is no longer monitored, the volume of the PhD thesis has been increased from 180 ECTS to 200 ECTS and the volume of general studies has been reduced.

Academic career model

The career model of academic staff motivates able young people to start an academic career and creates opportunities for its advancement. One of the most relevant strategic objectives of academic career management is to support the professional development and career opportunities of young research fellows at the University by offering PhD students fixed term junior research fellow positions and enabling them to apply, after postdoc, for positions of assistant professors, the first career level of the professor. The member of staff at the position of an assistant professor is expected to move up the career path within five years. Assistant professors can apply for start-up grants from Estonian Research Council and be supported in obtaining the right to supervise *via* supervisor competitions. As of 1.09.2021, the University has four assistant professors.

Until now, the University has not had an obligation to enter into contracts with junior research fellows. Due to forthcoming amendments to the legislative acts, the University will have the obligation to conclude employment contracts for working as junior research fellows with the PhD students matriculated in academic year 2022/2023, and during the PhD studies guarantee them the average income in Estonia (i.e. 1,400 euros per month). The state PhD student grant is currently 660 euros per month. To motivate PhD students and support the progress of PhD theses, the University already pays the PhD students participating in PhD research-related projects research scholarships of at least 440 euros per month per student and appoints the PhD students for the positions of junior research fellows (**Table 14**).

Table 14. Number of junior research fellows 2012–2021

	2012	2013	2014	2015	2016	2017	2018	2019	2020
Number of junior research fellows	0	12	28	27	44	64	74	82	71

Professional development of young researchers is supported by the institutional development program project ASTRA 2 measure – mentor program, which is aimed at students and young research fellows to gain entrepreneurial experience. Young people are mentored by top professionals and economic experts from the University, the private sector and the public sector.

Development of academic staff

One of the objectives set out in the University development plan is to fully support the development of the membership, and deeper collaboration. The University supports and promotes professional development of academic staff by enabling staff to participate in professional speciality specific and didactic continuing education courses and training, incl. digital competences, internships in Estonia and abroad, international professional conferences, symposia and seminars. Continuing education courses and training for staff are coordinated by the University Personnel Department with annual training plans based on analysis of the results of staff performance reviews, information from interviews, surveys and feedback, and suggestions from department heads and staff. Individual training plans based on the needs of staff are prepared in collaboration with staff members and immediate organisers of work during the performance reviews. Development of staff speciality-specific competence, research competence, and teaching and supervision competence is supported by the institutional development program ASTRA. PhD studies generally require

the beginning academic staff members to complete the subject "Higher education didactics" (3 ECTS) on basic teaching and supervision skills, and to acquire practical skills on the course "Practice in higher education teaching" (2 ECTS), teaching some subject.

In 2016–2020, speciality-specific and didactics related courses and training were organized, incl. the development of digital competencies. Transition to distance learning due to Covid-19 pandemic in the spring of 2020 significantly increased the need for developing digital competences. In collaboration with the educational technologist, online seminars for developing digital competencies were organised, incl. exchange of experiences and practices between staff members, in which a total of 338 employees participated. Department of Academic Affairs conducted experiential training for staff, primarily on assessment methods and criteria focused on learning outcomes. In 2020/2021 the total number of trainings was four and the events were attended by academic staff from three institutes (more than 100 lecturers in total). In 2021/2022 the events will be continued. Most online trainings are available for playback later. As a result of the trainings, the application of digital solutions and platforms in teaching and distance learning has increased and the skills of staff have developed, and this tendency is also reflected in the results of student feedback at ÕIS. Students' assessments of teaching staff, incl. the attitudes and teaching mastery, become more positive over the years (**Table 15**).

Table 15. Student feedback to academic staff for the academic years 2016/2017–2020/2021 (rated on scale of -2 to +2, where -2 is not at all satisfied...+2 very satisfied)

Academic year	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021
Assessment to academic staff	1.38	1.40	1.42	1.45	1.50

The membership satisfaction survey also shows a positive trend in staff satisfaction with courses and training and professional development opportunities (**Table 4**).

Academic staff participation in research, development and/or creative activities

The University has chairs lead by full-time professors, which comprise working groups in the academic activity responsibility areas. The task of the chairs is to implement and ensure the sustainability of research and development in the responsibility areas and educational activities of the University based on them. Heads of chairs direct research and development in the academic activity responsibility areas, are responsible for the level and development of their speciality field at the University, organise studies related to the field, ensure degree studies and academic succession.

According to the 2014–2020 academic staff regulation and the current Academic Staff Positions in Estonian University of Life Sciences regulation, academic staff in all positions (except teachers) are required to participate in research and development, thus ensuring the competence required for science-based teaching, incl. research supervision, at the University. Furthermore, the regulation sets an indicative percentage of teaching, research and development and organisational-administrative work suggested for each position and career grade. To increase motivation of academic staff and foster research, funds are allocated to each chair in accordance with the Procedure for Use of Baseline Funding of Research and Development Activities. This has significantly increased the activity of staff in research and development, e.g. in 2020, an average of 1.18 peer-reviewed research articles were published per academic staff member, listed in the *Scopus* or *Web of Science* databases. In 2017–2020, the staff participated in implementing a total of 476 research and development projects or contracts. Further information on research and development indicators, incl. financial volume and publication dynamics in Chapter ***3.11. Research, development and/or creative activities***. Information on research and development of academic staff members and the respective structural units can be found in the Estonian Science Information System (ETIS).

Collaboration within and outside the University

Academic staff collaborates in the field of teaching/studies and research within the University and with partners outside the University and Estonia. Various forms of collaboration are used, incl. project-based, contractual, informal, etc. activities. Collaboration is carried out in development of curricula, in development of new curricula, in teaching/studies and continuing education, research and development, supervision, committees (incl. defence committees), in reviewing master's and PhD theses and opposing PhD theses. According to good practice, opponents of PhD theses defended at the University are research fellows and academic staff from the other universities.

The University exercises the right and opportunity to invite scientists and prominent practitioners of their field to teach and/or conduct research as visiting academic staff – visiting professors, research fellows, lecturers or teachers, depending on the planned activities, qualifications and professional knowledge and experience of the person invited. Foreign visiting lecturers are lecturers or research fellows from a foreign university or foreign practitioner. In 2020, the University had 22 academic staff members with the status of (foreign) visiting employees (20 in 2019, 19 in 2018, 7 in 2017, 7 in 2016). Among academic staff on the curricula, the share of professional practitioners and visiting staff, incl. foreign visiting staff, is 15–30%. Academic (foreign) visiting staff are involved in teaching for single tasks, such as lectures, seminars or workshops, or supervising dissertations, for an estimated 50-60% of subjects. Visiting staff and practitioners are most involved in forestry and civil engineering curricula in order to involve more specific sectoral aspects.

An example of good collaboration in developing curricula is the joint initiative and collaboration of the academic staff of the University Institute of Agricultural and Environmental Sciences and the University of Tartu – an English taught master's curriculum "Environmental governance and adaption to climate change" was completed and opened for admission in 2021/2022. The curriculum focuses on mitigating the challenges posed by climate change. Academic staff of both universities and the best environmental specialists from various institutions and organisations are involved in teaching/studies.

Under the leadership of the lecturers of the Institute of Economics and Social Sciences, the joint Baltic master's curriculum "Agri-Food Business Management" was developed. Partners of the curriculum are Latvia University of Life Sciences and Technologies and Vytautas Magnus University. Students study at partner universities by semester. Within the curriculum, lecturers from the University of Tartu, Halmstad University and Nürtingen-Gieslingen University are involved in teaching in Estonia.

An English taught joint master's degree curriculum "Rural Community Development" is currently being developed with partners from the Latvia University of Life Sciences and Technologies, Vytautas Magnus University, Bucharest University of Economic Studies and the University of Helsinki. A joint English taught master's curriculum in ergonomics by universities of the three Baltic States is also being developed.

In Estonia, the University has collaboration agreements with the University of Tartu for "Technotronics" curriculum, with Võrumaa Vocational Education Centre for "Wood Processing Technology" curriculum and with TTÜ Tartu College to teach partner students specific subjects.

Intra-university collaboration takes place in research and development projects, as well as developing shared subjects and interdisciplinary modules. A good example is the inter-institutional collaboration of staff in projects managed by the Institute of Economics and Social Sciences. Estonian Environmental Investment Centre financed a collaboration project, which gives an opportunity for the staff of the Institute of Veterinary Medicine and Animal Sciences and the Institute of Forestry and Rural Engineering to expand their joint study facilities. Staff from the Institute of Technology and the Institute of Veterinary Medicine and Animal Sciences are collaborating on using nanomaterials in pathogen-destroying coating materials. Examples of development of inter-university interdisciplinary modules are the joint module on "Robotics" in "Technotronics" and "Wood Processing Technology" curriculum, the joint module on "Geomatics" in "Civil Engineering (Rural Building)", "Hydraulic Engineering and Water Pollution Control", "Forestry" and "Land Surveying, Property and Land Management", the module on "Environmental management and bioeconomy" and a module on "Entrepreneurship" in all higher education curricula. Collaboration experience and best practices are shared in the courses and training for staff organised by the University.

Employers and companies are involved in curricula development and practical training system. To develop students' practical training opportunities, seminars for supervisors are held across the university and in institutes to share experience; activities and requirements related to organising practical training are harmonised to ensure the effectiveness and quality of practical training. In collaboration with companies, possibilities for practical training, mutual expectations and the roles of the parties are mapped. Enterprises are involved in the development process of practical training, providing feedback and contributing to improvement of practical training organisation and curriculum development. The University and enterprises practical training supervisors participate in joint supervisor courses and training, collaboration seminars, etc. In 2017–2021 the University participated in the ESF project "Supporting collaboration of employers and educational institutions in developing the system for practical training" *(in Estonian)*. During the project, 114 new practitioners were involved in studies, 363 practical training supervisors from

enterprises were trained and sectoral collaboration seminars were held, which were attended by a total of 233 representatives from the University and enterprises. An overview of the results of the project is available on the University website as the description of the University practical training system *(in Estonian)*.

Assessment of academic staff performance

Academic staff member performance is evaluated and feedback is given during evaluation, performance review, and evaluation of tenure position performance. Evaluation is a periodic assessment of academic staff performance and compliance with the requirements for the position. The purpose of evaluation is to support the staff professional development and career opportunities and to motivate the staff to contribute to increasing the effectiveness of the University academic activities. When analysing the work of an academic staff member, the effectiveness of teaching and research, development and creative work, student feedback, the effectiveness of student supervision, the development of teaching and supervision skills, international mobility and entrepreneurship experience or other work experience in a field outside the University are taken into account. Academic staff members with an employment contract of unspecified term are evaluated at least once every five years. Evaluation is based on Academic Staff Positions in Estonian University of Life Sciences, the documentation is in the document management system. Training is provided to staff and members of evaluation committees on how to conduct evaluation, feedback is collected to improve the evaluation process.

First evaluations of academic staff working with employment contracts of unspecified term took place in the spring of 2020, when 68 academic staff members were evaluated: 6 professors, 1 leading researcher, 9 senior research fellows, 14 research fellows, 10 docents (corresponds to an associate professor), 26 lecturers and 2 assistants. At the end of 2021, the University had 88 evaluated staff members: 2 professors, 7 senior research fellows, 17 research fellows, 3 junior research fellows, 12 docents and 46 lecturers. Evaluated staff members whose current position no longer corresponds to the list of positions of academic employees established in the Higher Education Act, which entered into force in 2019, will be offered a new position corresponding to their qualifications.

The number of competitions for academic positions has decreased in recent years, as academic staff have been contracted for unspecified terms since 2015 (before 2015, the maximum duration of an employment contract was five years, followed by re-election). The average number of candidates for a position has increased thanks to international competitions. In 2020, an international competition was announced for 37 academic positions, 14 of them for professorships. On the average, there were 2 or 3 applications for a professorship, 8 for one of them. For lecturer vacancies, 2 or 3 applications were received on average, some of which came from abroad. On the average, there were 4 or 5 applications for the positions of research fellows, most of them from abroad. The largest competitions so far have been for research fellows and senior research fellows for the ERA Chair of Food and By-Products ValorizationTechnologies (Valortech), with an average of five people for each of the six positions available.

A full-time academic staff member is entitled to one semester free of teaching once every five years, the sabbatical leave, during which his or her duties are related to improvement of professional skills, research and development or creative work. In 2016–2020, 18 academic staff members used this opportunity.

Strengths, areas for improvement and planned development activities

Strengths	
• Number and age structure of academic staff and share of young staff ensures sustainability of teaching/studies • Academic career model supports young people in planning and starting their academic careers • Involvement of recognized (foreign) visiting lecturers and practitioners with required qualifications in teaching and research • Student feedback to lecturers is positive and satisfaction with teaching is rising	
Areas for improvement	**Planned activities**
• Academic staff members on the lecturer level is completing their PhD degrees • Using the sabbatical leave for conducting research, improving professional knowledge and skills or creative work, incl. teaching aids	• Mapping possibilities and needs to support lecturers for conducting research, incl. for obtaining a PhD degree, creating support measures and to communicate them to staff; optimising teaching/study workload of PhD students and concluding junior research fellow contracts with PhD students • Developing a support system to facilitate sabbatical leaves; more effective promotion and communication of sabbatical leave

3.7. CURRICULUM

The University offers science and knowledge-based education in accordance with the Standard of Higher Education *(in Estonian)* at three levels of higher education. As of 31.12.2020, Estonian University of Life Sciences had 45 curricula, 42 of them open for admissions. To reduce duplication within the University, some curricula were closed in 2016–2020, but new curricula were created as well, incl. curricula taught in English. The number of curricula open for admission (42) has remained stable. The number of students compared to 2020/2021 has increased (**Table 2**). Positive trend can be seen in admission numbers (**Table 2**). Number of students per curriculum has not changed much in the last five years and is on average 63 students per curriculum (**Figure 14**). Due to demographic situation in Estonia, the number of students enrolled in the first level of higher education decreased in all larger universities.

Due to the abovementioned, the number of students decreased primarily in bachelor's and civil engineering studies. However, as of October 2021, the number of students at these higher education levels has increased again: the number of students in bachelor studies per curriculum is 96 and in civil engineering 113.

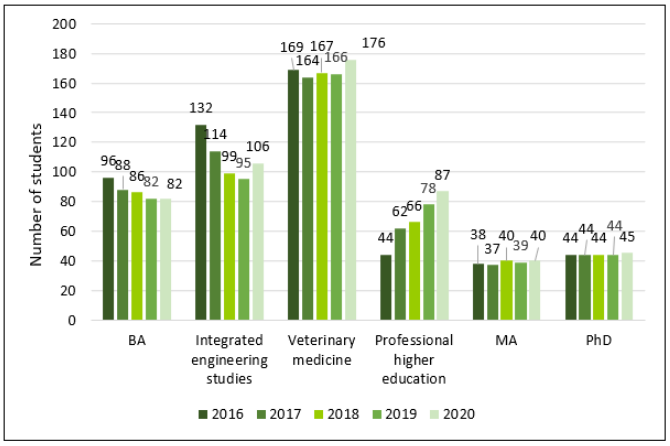

Figure 14. Number of students per curriculum by studies in 2016–2020.

Developing and implementing curricula

In creating and developing curricula (incl. curricula taught in a foreign language), a higher education institution proceeds from its objectives, sectoral competence and labour market needs, and takes into account the strategies of the state and expectations of the society. Curricula are based on up-to-date sectoral know-how and research. The volume of study specified in the curriculum is calculated in the credits of the European Credit Transfer System (ECTS), where one credit corresponds to 26 hours of student work, which includes face-to-face teaching (incl. e-learning), practical training, independent work and assessment of learning outcomes. The expected study load of students is realistic and in line with the volume calculation. It has been agreed at the University that the volume of face-to-face teaching makes up no more than 50% and no less than 15% of the volume of the subject. The volume of face-to-face teaching of the subject is determined in the course syllabus in the study information system (ÕIS). The distribution of the study load and the consistency of the study volume in the subject are monitored through student feedback.

The University has an important role in society in promoting agriculture, animal sciences and forestry, and in developing entrepreneurship in rural areas. Estonian University of Life Sciences is the only university in Estonia to apply the principle of a full value chain in teaching/studies and research – the research and curricula cover the entire food production chain, incl. produce for food, food production technologies, food hygiene and safety, product development, by-product valorisation, veterinary public health, marketing, economic aspects of value chain and environmental protection. The University is authorised to conduct studies in six curriculum groups, i.e. agriculture, forestry and fishing; veterinary medicine; environmental and life sciences; engineering, technology and manufacturing; architecture and construction; business and administration; and has the sole responsibility for higher education in Estonia in the fields of agriculture and forestry, animal sciences, environmental sciences, veterinary medicine and food science. All University curricula are interdisciplinary and practical in nature, ensuring the acquisition of knowledge and skills in various fields of bioeconomy, understanding the principles of sustainable development and developing

entrepreneurial attitudes. The curricula have created opportunities for student mobility and application of knowledge in companies, in working environment.

The structure of the University curricula and the study process are suitable for students with different levels of knowledge and skills. Applying different teaching/study methods to subjects allows the learner to choose the most appropriate way of achieving the learning outcomes. E.g. the food technology curriculum uses a research-based approach as one of the study methods, which enables the student to choose a topic of appropriate difficulty and integrate theoretical knowledge into practice, develop self-management and time management skills, get help, guidance, personal approach and feedback.

The University collaborates in teaching/study and research with other universities and research institutions, local companies, employers and professional associations, and Estonian Qualifications Authority (see Chapter ***3.6. Academic staff***). By the end of 2020, more than 100 companies were collaborating with the University as contractual partners. The University has one joint curriculum with the University of Tartu and one joint curriculum with two foreign universities; two more international joint curricula are in the opening phase (see Chapter ***3.6. Academic staff***). Curricula taught in foreign languages include at least 6 ECTS for studying Estonian language and culture.

The precondition of opening a curriculum (incl. curricula taught in a foreign language) is a justified need for the curriculum, and availability of academic personnel and other required resources. Curricula are developed considering the results of research of the transnational future labour trend monitoring and forecasting system OSKA, vocational standards and vocational education curricula. Quality assurance at the University is based on the Higher Education Act, Standard of Higher Education *(in Estonian)*, the Quality Assurance Standards and the Guidelines of the European Higher Education Area, and the University development plan and regulations. Learning outcomes of curricula are in accordance with the requirements set out in the Standard of Higher Education *(in Estonian)* for the corresponding level curriculum and the framework requirements for veterinary and civil engineering studies *(in Estonian)*. In the process of developing curricula, the University conducts a comparative analysis of similar curricula in leading foreign higher education institutions. To develop curricula, input is obtained in the process of internal curriculum assessment, and on an ongoing basis, incl. feedback from students, academic staff, alumni, employers, and external evaluators, also from sectoral research results.

In the process of developing and opening bachelor's and professional (vocational) higher education curricula, the University ensures the learning outcomes compliance with the requirements of the qualification framework level 6, and level 7 general requirements for the master's degree curricula. The University confers the graduates of the curriculum *Civil Engineering (Rural Building)* (382) the Diploma Civil Engineer in Buildings and Structures, level 7 higher education qualification*;* since 2013 the curriculum *Hydraulic Engineering and Water Pollution Control* (383) the Diploma Engineer in Hydrotechnical Engineering, level 7 higher education qualification, and the Diploma Engineer in Water Supply and Sewerage, level 7 higher education qualification; the curriculum *Energy Application Engineering* (432) the Diploma Electrical Engineer level 7, Initial Higher Education level; since 2016 the curriculum *Technotronics* (81050) the Diploma Mechatronics Engineer level 6, Initial Higher Education level; and since 2017 the curriculum *Production Engineering* (437) the Diploma Mechanical Engineer, level 7 Initial Higher Education level.

New requirements for the content and structure of curricula at the University were introduced in 2018, in order to modify and update curriculum goals and learning outcomes and link subjects learning outcomes more effectively to curriculum goals and learning outcomes, taking into account the results of various assessments and student feedback (**Table 16**), surveys and conversations with the graduates, alumni and partners. To make the links more understandable, the structure of the curricula was reorganised and based on modules, so that the subjects are grouped into targeted sets based on the learning outcomes of the module. The learning outcomes of the curricula were updated according to the needs of the labour market and OSKA as highlighted in the report, incl. future skills and sustainable development goals. An interdisciplinary module on "Environmental management and bioeconomy" (8 ECTS) and an "Entrepreneurship" module (starting from 8 ECTS) were added to all first-level curricula according to the mission, vision and goals of the University. Bioeconomy comprises all responsibility areas of the University, as it includes bioresources (microalgae, wood, biochar), food and non-food bioproducts, bioenergy, biomaterials and waste. The objective of the module on "Environmental management and

bioeconomy" is to make students aware of the nature, role and potential of bioeconomy in global context and in Estonia, the connections between the fields of bioeconomy and the current possibilities of estimating and transforming biomass resources. An inter-university seminar was held 22.01.2020 for a better understanding of the Global Sustainable Development Goals (UN, 2015–2030), which addressed both global and Estonian sustainable development goals, and gave an overview on how environmental issues are reflected in the curricula of the University. The goals of sustainable development are highlighted in the learning outcomes and objectives of the updated curricula and in the descriptions of the subjects. Increase in environmental awareness is evidenced by the annual feedback from students (**Table 16**).

Table 16. Student feedback on curriculum design and environmental awareness for the academic years 2014/2015–2020/2021

Graduates satisfaction rate	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021
The subjects are in logical sequence; Substantial overlapping between the subjects is justified*	0,8	0,6	0,9	0,7	0,8	1,1	0,8
Studies increased environmental awareness**	3,4	3,4	3,8	3,7	3,8	3,9	3,7

**rated on scale of -2 to +2, where -2 is not at all satisfied...+2 very satisfied*
*** rated on a 5-point scale, where 1 didn't rise…5 increased*

To diversify the forms of education for students and expand collaboration with enterprises, the University launched a program in September 2021 as part of the ASTRA project, which aims to map the principles and opportunities of workplace-based learning (the so-called apprenticeship, practical training), identifying and incl. the interest and opportunities of enterprises in one or more curricula in the field of engineering from the autumn semester of 2022.

New updated versions were implemented on all bachelor's curricula, civil engineering, veterinary medicine curricula and professional higher education curricula in 2020/2021. Updated versions of the autumn semester include interdisciplinary modules. New versions of master's and doctoral curricula were implemented in 2021/2022.

In PhD curricula, the objectives and learning outcomes, the content of general education and speciality subjects were updated, and the number of specialisations was reduced. The significant reasons for the changes were the agreements concluded between Estonian universities in 2019, the observations of stakeholders (PhD students, supervisors, employers, external evaluators) on the structure and flexibility of the curriculum, the overly strict requirements of the defences and the need for industrial doctorate. As a result of the changes, since the 2020/2021 admission the PhD curricula (for example Veterinary Medicine and Food Science curriculum (**Appendix 28**) have the volume of general and professional studies for 40 ECTS (previously 60 ECTS) and the volume of PhD thesis 200 ECTS (previously 180 ECTS). An "Entrepreneurship" module was added to the curriculum, in addition to the "Higher education didactics" module, in order to provide an opportunity to choose an entrepreneurship direction in addition to the academic direction. The choice of subjects and speciality courses based on the topic of research was made more flexible in the curriculum. According to the updated dissertation requirements, the 3rd scientific publication does not have to be accepted for publication before PhD defence, a review by an international scientific journal or an editorial board is sufficient. The "Entrepreneurship" module of the curriculum is of considerable interest to PhD students; in the spring semester of 2021, 13 doctoral students passed the module. In the autumn semester of 2021, the focus of the development of PhD studies was on the conditions and content of industrial doctorate, the state commitment and support are expected for the admission in 2022/2023.

The multi-level structure of the process of modifying and opening curricula supports the development of curricula and keeping them relevant and up-to-date. This process ensures the quality of the curriculum and compliance with requirements. Opening, modification and closing curricula is in the competence of the University Senate; changes related to subjects of curricula are approved by the Senate Committee of Academic Affairs.

Practical training

The University curricula have practical output, which is ensured by integrating theoretical and practical studies and training. Practical training is conducted as internships, laboratory work, hands-on practice, training in an enterprise or research practice. Instead of lectures, the forms of teaching at the University are lecture-seminars, lecture-practicums, and problem-based learning, in order to test and apply the theory in

practice. Curriculum development is an ongoing process and the subjects of the general module (e.g. physics, mathematics) are being integrated into the subjects of the speciality modules. Thus, compact subjects are formed, which increases the collaboration of lecturers. For more effective application of students' knowledge and skills in working environment, the volume of training in an enterprise was increased for the first level curricula from 2020/2021. The minimum volume of training in an enterprise is at least 6 ECTS (5 ECTS until 2019/2020); in the curriculum of "Animal Science" it is 8 ECTS, "Horticulture" 10 ECTS, "Production and Marketing of Agricultural Products" 10 ECTS, and in the curriculum of "Food Technology" 12 ECTS. To ensure more efficient and effective organisation of practical training in enterprises, the University implements the mandatory agreement for practical training in an enterprise for all three parties (student, practice provider, the University). The agreement makes it mandatory for the practice supervisor to fill in a feedback questionnaire and assess, among other things, the student's level of previous knowledge and skills, attitude towards work, and ability to adapt.

Practical training has the largest share in bachelor's curricula in "Forestry" and "Nature Based Tourism". Different types of practical training, incl. training in an enterprise, have the largest share in "Veterinary Medicine" and professional higher education curricula.

To expand the practical training network and involve practitioners in the studies, the University participated in an ESF-funded project in two periods (01.09.2017–31.08.2019; 04.02.2019–30.06.2021), which is described in more detail in Chapter ***3.6. Academic staff***. Involvement of practitioners and enterprises in academic teaching and the development of problem-based learning at the University is supported by the institutional development program ASTRA. In 2016–2021, the University developed subjects and problem-based learning in collaboration with enterprises in at least 30 subjects.

In the spring of 2021, the University participated with three curricula in the project "Recognition of the internship and practical training process in vocational and higher education" within the framework of the ESF activity "Development of vocational and higher education in meeting labour market needs (the PRÕM project)". The curricula were *Rural Entrepreneurship and Financial Management* (bachelor's), *Economics and Entrepreneurship* (master's), *Accounting and Financial Management* (master's). The aim of the project was to harmonise practical training processes in higher education institutions *via* self-assessment and external assessment, based on certain assessment criteria. Participants received feedback from the assessors, which included strengths and areas for improvement in the practical training process, as well as suggestions for improvement from the assessors. The assessment committee recognised the practical training process of the University rural economics curricula with a quality mark.

Internal curriculum evaluation

In 2021, the University implemented internal assessment process of curricula (**Figure 15**), which is carried out in two stages. First, the content and relevance of the subjects in the curriculum are assessed, then the relevance of the curriculum, and compliance with the internal and external quality indicators and requirements. The results of internal assessments are used as evidence-based input in curriculum development.

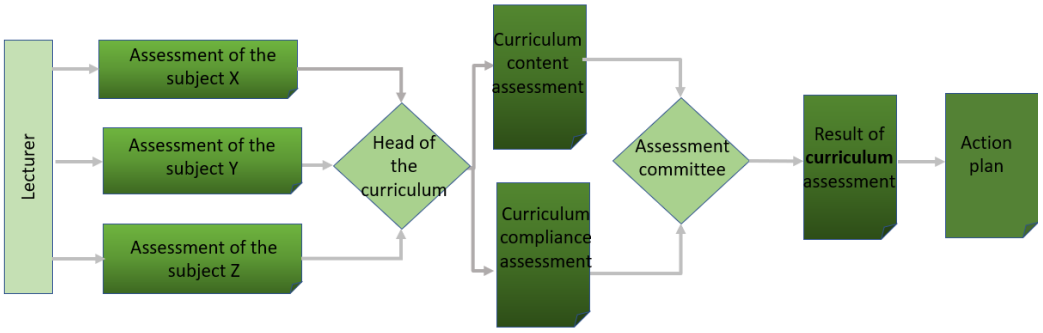

Figure 15. Internal curriculum assessment.

Internal assessment was carried out in 2021 for the bachelor's curricula "Food Technology" and "Engineering", in the professional higher education curricula "Technotronics" and "Wood Processing Technology". According to Internal assessment principles for Estonian University of Life Sciences, internal

curriculum assessment is carried out once every three years. In the development plan action plan for 2021–2025, the University set the objective that by 2025 all curricula will have passed an internal assessment at least once and consistency will have been established in internal assessment of curricula.

Strengths, areas for improvement and planned development activities

Strengths	
• Curricula correspond to the mission, vision and strategic development directions of the University and have practical output, incl. an orientation towards the labour market and the living environment needs • The procedure for changing and developing curricula is described and ensures quality; curriculum development is carried out in collaboration with entrepreneurs, professional associations, the alumni association and other stakeholders inside and outside the University • Entrepreneurship and management tracks have been added to PhD studies • Internal curriculum assessment procedure has been worked out and applied	
Areas for improvement	**Planned activities**
• Better integration of general and speciality subjects • Launching work-based learning in engineering • Ensuring regularity and consistency of internal curriculum assessment process	• Integration of general module subjects (e.g. physics, mathematics, etc.) and speciality module subjects into compact subjects, incl. more effective integration of theory and practice • Launching work-based learning in engineering: developing a curriculum in collaboration with stakeholders and describing the study process • Planning and implementation of curriculum development activities as a result of internal assessment

3.8. LEARNING AND TEACHING

Admission requirements and process

Admission to the University is by open competition through the Study Admission Information System (SAIS), with international student applicants submitting applications in the DreamApply environment. Admission requirements (in Estonian) are uniform and there are no fundamental differences between curricula. Candidates' potential for successful completion of the curriculum are assessed on the basis of an entrance test, interview, portfolio, letter of motivation and/or state examination results, with a threshold of 40 points (max. 200) set for the state examination results. International applicants will be interviewed. Admission to PhD studies takes place on the basis of a competition according to the topics approved by the Senate Academic Committee. The candidate for PhD studies submits a relevant PhD thesis plan/research proposal (1-2 pages). Admission requirements and schedule are available to student candidates at least six months prior to the start of admission. Admission for candidates from outside Estonia (mostly for English taught curricula) will be open in February and for candidates from Estonia in May. Thus, candidates and persons interested can read the information early and set their plans. Admission lists will be published in SAIS and an acknowledgement of admission will be sent to each recipient via SAIS by e-mail. Candidates for international students will receive an admission notice through DeamApply.

Candidates for the first level of higher education must have a secondary education or equivalent; for the second level of higher education a bachelor's degree or a professional higher education certificate obtained on the basis of a curriculum of applied higher education or a qualification corresponding thereto. The pre-condition for the commencement of PhD studies is a master’s level degree or a qualification equal thereto. The University recognises foreign qualifications in accordance with international conventions, international agreements and Estonian legislation. As a rule, the University sends the diplomas and academic supplements of all foreign student candidates to the Estonian ENIC/NARIC Centre for Assessment and Recognition of Qualifications. The ENIC/NARIC Centre assesses whether or not a student candidate has the right to access the corresponding higher education level. The University has an agreed system for the recognition of qualifications for candidates who have completed upper secondary education in the Republic of Finland and for those who have completed upper secondary education in the International Baccalaureate (IB) program. A student candidate who has acquired the required level of education abroad shall submit a certificate of compliance with the minimum language proficiency requirements of the curriculum.

To ensure equal access, the University has created alternative opportunities for admission to the first level of higher education, e.g. the average grade of the certificate of general secondary education was accepted for candidates who had completed vocational secondary education and the candidates who graduated from upper secondary school in the spring of 2021 without the mandatory state exams. Motivated student candidates have the opportunity to receive additional points (e.g. graduation from the Estonian University of Life Sciences School of Science, professional certificate of a corresponding speciality) or admission without competition (having graduated upper secondary school/gymnasium with a gold or silver medal, participated in international or national subject olympiads/subject competitions).

The University recognises the best student candidates in the first level curricula of higher education on the basis of the ranking of admission results and presents them with the University cap "*tekkel*" at the opening ceremony of the academic year, awarded by the Rector. The state motivates studying in curricula of state priority areas with speciality scholarships. Estonian University of Life Sciences provides ten such curricula (2 bachelor's, 6 master's and 2 professional higher education curricula). The University has not had cases of applicants choosing a curriculum for the possibility of receiving a speciality scholarship. The speciality scholarship is more of a bonus to the choice the applicant has made.

Teaching/study process

Teaching/study process is built on the learner-centred approach, which means creating an environment conducive to learning, considering individual abilities and needs of students, supporting their development and providing a challenge for students of all levels. The subjects of the curriculum form a coherent whole, which requires students to consistently acquire knowledge and skills and apply them in the study process. Students pass the subjects of the general module, speciality module, electives and optional subjects' module of the curriculum. Upon registration for subjects, the requirements for prerequisites established for the subjects are followed. Versatile teaching methods (group work, research, seminar, project, case study, problem-based learning, etc.) are used to implement and develop students' individual abilities. Different teaching and assessment methods offer challenges to students of different levels, e.g. allow students to choose a research topic, case study, project. Interesting, topical and innovative research topics motivate students to contribute more and learn more.

PhD studies are conducted on the basis of individual plans prepared by the PhD student in collaboration with the supervisor(s). The individual plan presents the objectives of the PhD research, the work planned year-by-year; the courses, subjects and training to be completed based on the topic of the PhD thesis, as well as presentations of research results at PhD seminars and international research conferences. The individual plan identifies the industrial or academic direction of the PhD studies. In the latter case, the supervisor provides the PhD student with practical teaching experience in one of his/her subjects within the "Higher education didactics" module. The PhD student's individual plan is approved by the institute council and the plan is the basis for monitoring the PhD student's progress during his or her evaluation. The PhD student participates in evaluation with his/her supervisor(s). During the evaluation, the evaluation committee evaluates the progress of the PhD thesis, compliance with the objectives set, and discusses with the supervisor(s) how to support the progress of the PhD thesis. If necessary, the evaluation committee makes suggestions to the PhD curriculum development committee or the University management to make changes in the PhD studies or to find solutions to the issues.

Students are involved in planning and conducting the study process. At the beginning of the studies, the academic staff give the students an overview of the curriculum and the objectives of the subjects, learning outcomes and assessment methods. Students can participate in the choice of teaching methods and setting the deadlines and assessment methods for submission of work (reports, projects, etc.). E-learning, video materials and other digital learning tools support the development, creativity and innovation of a self-directed learner; furthermore, develop general competences in students: digital literacy, (foreign) language skills, entrepreneurial initiative, communication and teamwork skills, time and self-management skills. In their feedback, students and graduates have rated as high the development of general competencies within the curriculum and subjects. In 2016–2020, their rating has been 1.1 on average (-2 not satisfied…+2 very satisfied). Practical training, laboratory work and seminars are conducted in small groups, which motivates students to participate more actively in the study process, improves students' communication and presentation skills, and allows the academic staff to give students individual feedback. One of the methods that activates students is the so-called inverted classroom or mosaic method, where students share the

knowledge and skills acquired through a report, research, project, etc. with their fellow students. Active teaching approach requires motivation, didactic competence and effort from academic staff. Involving students in the learning process is successful, if both parties contribute to it, i.e. both teachers and students actively participate in the study process. The University organises various courses and training for staff to practice teaching methods, develop teaching skills and effectively apply different forms of teaching (contact/face-to-face teaching, practical training, independent work).

Theoretical and practical learning is integrated in teaching, and the share of practicums, seminars and laboratory work is relatively high. The volume of contact studies, incl. e-learning (lectures, practicums, laboratory work, seminars) makes up no more than 50% and not less than 15% of the volume of subjects; the volume of independent work makes up at least 50% of the volume of subjects. Such organisation of studies encourages students to take more responsibility for their studies. Students are also motivated by feedback from staff. Students are very interested in constructive feedback by academic staff directly during the subject. A good motivator is formative assessment, incl. feedback and assessment of students' independent work. Through group and team work, fellow students are involved in feedback. To develop students' individual abilities, lecturers offer consultations, individual classes and additional study materials.

The suitability of a learner-focused and learner-centred approach to teaching is reflected in **Table 17** of students' positive feedback on subjects (content, organisation and teaching of subjects).

Table 17. Student feedback on subjects for the academic years 2016/2017–2020/2021 (rated on a 5-point scale, where 1 not at all satisfied…5 very satisfied)

Academic year	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021
Assessment to the subject	4.09	4.12	4.07	4.14	4.21

A positive example is the continuing increase in teaching/study satisfaction rate during the COVID-19 pandemic, which shows how cohesive students and academic staff are in such unexpected and unprecedented situations.

Teaching/study methods and materials

Modern, purposeful and effective teaching/study methods and tools are used in studies, incl. digital tools that support acquiring learning outcomes in subjects, student creativity, innovation, and developing general competences, incl. digital competences. Academic staff has become more aware of the significance of digital learning, as it enables to enrich studies and to ensure that studies can continue in situations where contact learning / face-to-face classroom learning is not possible. Staff interest in digital tools and e-learning is reflected in increase in the number of Moodle courses (**Table 23**) as well as participation numbers in various courses and training, introducing e-environments and digital tools. Use of web-based platforms in the study process has also expanded in recent years. Proportion of distance learning increased significantly during the spread of the COVID-19 virus, when face-to-face studies were banned. Proportion of distance learning also increased due to the fact that several master's degree full-time curricula were modified and became block mode curricula, where studies take place as study sessions, considering the needs and preferences of students. Teacher-centred teaching methods, such as lectures and guided discussions, are being replaced by learner-centred methods, and the principle of the so-called inverted classroom, where the responsibility for learning lies with the student, is increasingly being applied. Teaching skills of academic staff, incl. the use of teaching methods and tools that support learning, have received very good feedback from students and the results show a positive trend (**Table 18**).

Table 18. Student feedback results for teaching for the academic years 2016/2017–2020/2021 (rated on scale of -2 to +2, where -2 disagree...+2 agree)

Students satisfaction rate	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021
Supportive attitude of academic staff to learning	1.46	1.47	1.48	1.51	1.56
Mastery of teaching	1.3	1.31	1.33	1.36	1.43
Relevance of study materials	1.42	1.42	1.44	1.48	1.53
Clarity of organisation of studies	1.38	1.38	1.4	1.44	1.48
Teaching as a whole	**1.39**	**1.40**	**1.41**	**1.45**	**1.50**

The University plans to further enhance the use of web-based and digital learning methods in the study process and has set an objective to develop digital learning methods (e-learning, flexible learning, blended learning, online learning) in all subjects by 2025. Therefore, the focus in the forthcoming period will be on providing relevant courses and training and planning relevant activities.

Practical training

The knowledge and skills acquired in curricula are achieved and consolidated by students in subjects with various practical activities in practicums, laboratory work, study practice and training in enterprises. Study practice and training in an enterprise are purposeful activities organised to achieve learning outcomes, aimed at applying the acquired knowledge and skills in a working environment. Practical training can also be the so-called research practice on a topic related to the enterprise in the master's degree curricula. Study practice or practical training is supervised by the academic staff member of the respective subject, training in an enterprise is supervised by a supervisor from the enterprise. Research practice is supervised by academic staff members and a supervisor from the enterprise. The volume of study practice in curricula varies and can be up to 13 ECTS (e.g. the bachelor's curriculum in "Forestry"). The Statute of the Curriculum stipulates a minimum volume for training in an enterprise. The minimum volume of training in an enterprise in the bachelor's and civil engineering curricula is 6 ECTS, in the master's curricula 5 ECTS. Training in an enterprise has a very large proportion in the curricula of professional higher education – the minimum volume is 35 ECTS. The share of study, enterprise and clinical practice is the largest in the "Veterinary Medicine" curriculum. Training in an enterprise is performed on the basis of an agreement concluded between the University, the student and the enterprise. The agreement sets out the purpose and scope of the practical training, the volume, the rights and obligations of the parties, incl. the responsibility for ensuring the quality of the practical training. Training in an enterprise is coordinated by the University supervisor, who advises the student and the enterprise supervisor and resolves the issues that arise during the process. The University evaluates fulfilment of objectives of the practical training and acquisition of learning outcomes on the basis of the student's practical training diary or report, defence of the results and the feedback of the supervisor from the enterprise. In collaboration with the University staff and enterprises, all curricula have partners of practical training enterprises, from which the student has the right and opportunity to choose an enterprise suitable for the practical training. In coordination with the University supervisor, it is also possible to select an enterprise not in the list, incl. an enterprise abroad.

Students of the "Veterinary Medicine" curriculum make the most of the opportunity to do practice abroad, to gain diverse experience and exposure to more specific cases and to deal with patients who may not be available to meet in Estonia. Erasmus+ program supports practical training abroad, and the portals displayed on the University website help to find opportunities for practical training (in Estonian and in English), as well as recommendations by previous students. Practical training abroad is assessed in the same way as practice in Estonia.

Student motivation and involvement in study quality improvement

Students and alumni highly appreciate the practicality of the University curricula and the links to real working life, and value the open, supportive and friendly learning environment that motivates to study and contribute to the development of the University life. According to the University institutes, 70–75% of graduates are or have been in professional employment, which means that the University graduates are in demand in the labour market. Students are motivated to study and graduate. On average, 80% of students graduate with the nominal period and 6–9% with an extra year (n + 1). The highest nominal graduation rate is in veterinary studies (91.5%); generally, the students in professional higher education and civil engineering need an extra year to complete their studies, mostly due to their obligation to serve in the Military Service; and master's and PhD students due to parental leave. Students who enter speciality related work during their studies and drop out of their studies will mostly later find their way back to the University external studies to obtain the academic degree necessary for the professional career. It is estimated that an average of 10-15 students finish the studies as external graduates each year, most of them in the "Civil engineering (Rural Building)" curriculum.

Students contribute to the activities of the University and actively participate in improving the quality of the study process and study organisation. Students are members of decision-making bodies (e.g. the University Senate, institute councils) and committees (e.g. Senate committees, curriculum development committees, scholarship grants and scholarship award committees), participate in the University Board and

chairs meetings and seminars, and participate in developing documents regulating educational activities (e.g. Study Regulations) and give constructive and meaningful feedback on the quality of teaching and the learning process. Student feedback is used to improve the quality of learning and to plan curriculum development activities. Feedback is regularly requested through ÕIS at the end of the autumn and spring terms of each academic year; feedback on the curricula is asked from graduating students in the spring term immediately prior to graduation.

In addition to regular surveys, additional surveys and meetings are held on the organisation of studies, initiated by curriculum leaders, directors of academic studies, academic staff of speciality introductory subjects, course supervisors, Language Centre, Department of Academic Affairs, incl. the career specialist, psychologist, as well as students and Student Union. Good examples are the regular meetings of the course supervisor and students of the curriculum of "Rural Entrepreneurship and Financial Management", as well as the regular meetings of academic staff of horticulture with master's students, where curriculum issues and other topics of student life are discussed. Students participate in development seminars for chairs (e.g. Chairs of Biodiversity and Nature Tourism, Environmental Protection and Landscape Management) and discuss curricula, study organisation and feedback. In the spring semester of 2021, the Language Centre conducted a survey on digital learning a foreign language among students studying English for Specific Purposes. The results concluded that digital learning had a positive effect on the student's personality development, social skills, time management and study skills; however, more efficient methods for digital learning (e.g. interactive tasks and communication development methods) were highlighted as an area for improvement.

The active and motivated Student Union with its committees expresses opinions and raises topics at the University meetings. As there was an abrupt transition to distance learning due to the COVID-19 pandemic, the Student Union conducted a survey every semester on student satisfaction and quality of distance learning. The results of the feedback are an input for future decisions by the University in critical situations. There is clear indication of students' desire for face-to-face studies, with preference of even a hybrid lecture to be attended in a "real" classroom.

Competitiveness of the University graduates

When creating and developing curricula, the University takes into account the national strategies and expectations of the society, incl. labour market needs, future skills required (e.g. social and management skills, creativity, critical thinking, computer skills and entrepreneurship, teamwork, individual responsibility and risk assessment), and the labour demand monitoring and forecasting system OSKA results, and professional standards. The University has integrated theoretical and practical learning and linked professional studies and practice of general competences, incl. entrepreneurship, to ensure the competitiveness of students / graduates in the labour market. Correspondence between the expectations to curricula and content of curricula is confirmed by the results of the alumni survey conducted in the autumn of 2021 (**Table 19**).

Table 19. Alumni satisfaction rate with studies and curricula in 2021 (rated on a 10-point scale, where 1 not at all satisfied…10 very satisfied)

Alumni satisfaction rate	Rating
Knowledge acquired during the studies, incl. on environmental sustainability and entrepreneurship	8.5
General and transferable skills acquired during the studies	8.4
Correspondence of the curriculum and the speciality	8.0
Shaping attitudes (incl. decision-making, independence, motivation to work and develop, broad thinking)	8.4

The University graduates play an important role in developing entrepreneurship in Estonian rural areas and in promoting agriculture, incl. plant and animal production and forestry. Alumni have the knowledge and skills to produce raw materials for food, to guarantee the hygiene and safety of food production, thus food security. Alumni address areas that support sustainable development, such as environmentally friendly energy supply, sustainable use of terrestrial and water resources, environmental sustainability, incl. the protection of biodiversity and landscapes, ecological building materials and technologies, and environmentally friendly waste management. The University graduates have the advantage of being

competitive in agricultural sciences and veterinary medicine, forestry and environmental sciences and in the areas of engineering and technology connected therewith. These specialists have a strong potential to create new jobs and be successful and competitive in Estonia and internationally with their professional knowledge and social skills.

Strengths, areas for improvement and planned development activities

Strengths	
• Design of study process takes into account the individual abilities of the students and offers a challenge to students of different levels • Practical training, laboratory work and seminars are conducted in small groups, which motivates students to participate more actively in the study process • Involving alumni and employers in teaching is invaluable; students appreciate it • Demand for the University students and graduates in the labour market and great interest of enterprises in participating in practical training and study process	
Areas for improvement	**Planned activities**
• Supervising the student's independent work and supporting the development of a self-directed learner more effectively	• Conducting digital learning courses and training for academic staff to supervise independent work more effectively and to support the development of a self-directed learner

3.9. STUDENT ASSESSMENT

Assessment criteria

Assessment of students, i.e. assessment of achieving the learning outcomes, is a part of the learning process, in the course of which an assessment is made of the level of knowledge and skills acquired by a student. Course syllabus of a subject identifies the objectives of the subject, learning outcomes, schedule, assessment methods for achieving the learning outcomes and the principles of grade components. Course syllabus is available in the University study information system (ÕIS) by the beginning of registration for subjects. Academic staff collaborate within a subject and across subjects. Within a subject, collaboration takes place for working out teaching methods, assessment methods and criteria, and identifying the criteria for the final grade. One form of interdisciplinary collaboration is problem-based learning, e.g. the same source data is used for different solutions, which ensures a clearer link between the assessment criteria and the learning outcomes and objectives of the curriculum. The method is applied in teaching e.g. the curricula of "Land Surveying, Property and Land Management", "Civil Engineering (Rural Building)", as well as "Food Technology", in the process of conducting research.

Understandable, comprehensive and appropriate assessment methods are used to assess the level of knowledge and skills acquired by students. Feedback by academic staff to students supports achievement of the learning outcomes of subjects. Student satisfaction with output-based assessment and supportive feedback by academic staff is presented in **Table 20**. Different assessment methods are used: traditional (e.g. test, report, oral / written exam), but also complex methods (e.g. project, case study, problem solving), thus assessing general competencies (incl. foreign language, presentation, communication skills; reading comprehension, written expression and teamwork skills, etc.), which support the development of a self-directed learner.

Table 20. Student feedback on assessment based on learning outcomes and feedback to support learning for the academic years 2016/2017–2020/2021 (rated on scale of -2 to +2, where -2 disagree...+2 agree)

Students satisfaction rate	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021
Feedback to support learning	1.32	1.36	1.36	1.39	1.43
Assessment of learning outcomes	1.49	1.51	1.52	1.55	1.61

Assessment of learning outcomes is regulated by the Study Regulations and assessment is specified in the course syllabus of each subject. Assessment, methods, criteria and tasks form a coherent whole, support learning and achieving learning outcomes throughout the learning process. Lecturers give an overview of the whole learning process, incl. assessment, at the beginning of studies. Assessment methods and criteria, deadlines and principles of grade components are agreed upon, therefore ensuring transparency and clarity

of assessment, and equal opportunities. If possible and necessary, assessment is carried out in collaboration with several lecturers, incl. joint assessed tasks. At least 50% of subjects are taught and assessed by two or more lecturers in the University. The largest number of subjects taught by several lecturers are in the curriculum of "Veterinary Medicine", where clinical knowledge and skills are assessed by several lecturers. In subjects where project, research, portfolio or report approaches are applied, several teachers are involved in assessment process accordingly. Defences of final theses and final examination are assessed by a specific commission.

Formative assessment

Feedback as an integral part of learning process has an important role in assessment process. Relevance and significance of learning outcomes-based assessment that supports learner development is increasingly understood by academic staff members. Learning process can be supported at different stages with appropriate assessment methods. Pre-assessment or diagnostic assessment, mid-term assessment and peer assessment are increasingly used in learning process, which, combined with feedback, guide the development of a self-directed learner and enable the learner to take responsibility for their studies. Lecturers are motivated to find solutions and measures to provide learning-friendly feedback to each student, incl. in groups and larger study groups, as well as in distance and e-learning. E-learning environment Moodle is no longer just a place to store study material and a channel for organising independent work, but rather an interactive collaborative learning space that supports the learning process and is designed to benefit all parties. In addition to annual increase in the number of e-learning courses, the quality of e-courses has improved significantly. Several of the University e-courses have a nationally recognised quality label. In 2018, the courses "VL.1025 Quality and safety of milk and dairy products" (Estonian taught students), "VL.1025 Quality and safety of milk and dairy products" (English taught students) and "VL.1240 Human hygiene and health" were recognised with the quality label. The course "VL.1025 Quality and safety of milk and dairy products" also won the title "E-course of the year 2018". In 2020, the courses "AU.579 Hygiene requirements and staff hygiene in beauty and personal services" and "OP.1447 Information retrieval and use of databases" were recognised with the quality label.

PhD student's evaluation

PhD students' progress is evaluated each year. Evaluation is regulated by Study Regulations and evaluation procedure guarantees the impartiality and transparency of evaluation. Evaluation is based on the PhD student's individual plan, which is structured so that achieving the goals planned for each academic year can be evaluated. Principles of compiling individual plans for PhD students are described in Chapter ***3.8. Learning and teaching***. Progress of PhD students is evaluated by a committee of at least five members of the corresponding PhD curriculum, formed by the order of the Vice-Rector for Academic Affairs. PhD students submit a formal report and make a presentation on what has been done and the objectives set. Evaluation takes place in a public meeting with the participation of PhD students and supervisors.

Even though evaluation is an assessment of the PhD student's work, and may result in a decision that the PhD student's progress does not meet the requirements and the ex-matriculation of the PhD student is initiated; nevertheless, evaluation is rather a process to support the PhD student's professional development and foster completing the PhD studies. At the evaluation meeting of the evaluation committee, PhD students and supervisors, specialists of the same field have the opportunity to discuss the bottlenecks and solutions and to give advice and recommendations to PhD students and supervisors, to contribute to the progress of research and to remove obstacles. Issues referred to in the evaluation process, which require a wider discussion at the University or about wider policies, are forwarded by the committee to the relevant decision-making body or specialist. Such a system helps to intervene in the progress of PhD studies and supports and motivates the PhD student to achieve his / her research objectives on time.

Recognition of prior learning and professional experience as component of curricula

The University recognises prior learning and professional experience (RPL, VÕTA in Estonian) as part of completing curricula. Application, recognition and assessment of RPL is regulated by a regulation of the University Senate. The RPL process is free of charge for the student. The volume of credits applied for in 2016–2020 (**Table 21**) shows that students actively use the RPL. RPL advisors and directors of academic studies in institutes support and advise students on RPL issues. RPL is most often requested to fulfil learning outcomes of curricula, the corresponding modules or subjects. RPL is mostly based on learning

outcomes of curricula. In some cases, the acquired competencies have to be assessed in the context of the subject competencies, as certain subjects have a central strategic function in a curriculum. Subject-based recognition is applied primarily for the curricula the University issues a professional certificate for ("Technotronics", "Ergonomics", "Production Engineering", "Civil Engineering (Rural Building)", "Hydraulic Engineering and Water Pollution Control"), as the professional standards set specific requirements, often subject-specific, for competencies. Subject-based approach is applied for RPL in the curriculum of "Veterinary Medicine", the specifics of which are largely the reason for negative decisions on RPL (**Table 21**). Work experience as part of a curriculum is applied to somewhat less, this aspect is often combined with continuing education.

Table 21. Credits applied for and recognised as RPL in 2016–2020

Accreditation year	Applied ECTS	Awarded ECTS	Not awarded ECTS
2016	4835	4501	319
2017	3814	3717	97
2018	3381	3216	165
2019	3299	3177	122
2020	3256	3016	240
TOTAL	**18585**	**17627**	**943**

Processing RPL applications, timely and fair assessment of the transfer of study results and the quality of assessment is done by the RPL committee responsible for the process. Chairman of the committee may involve representatives of students, experts from the University and from outside the University in the work of the committee. Processing RPL efficiently can be done in several ways, e.g. for the simplified RPL process, the RPL form does not have to be filled in for the transfer of subjects. Another option is subjects that the student has already taken at the University, for example when studying in another curriculum, which can be recognised with the prior agreement of the committee and the student. A joint RPL committee for PhD curricula has been formed, which ensures a uniform and equal approach to PhD students' applications. The study information systems of Estonian universities are publicly available, the information on the objectives and learning outcomes of the subjects makes it convenient for both the student and the assessors to recognise previous studies.

Procedure for assessment disputes

Study Regulations provide for organisation of formal education, incl. assessment of learning outcomes achieved and the rights and obligations of the student. Adherence to the regulations is mandatory for the academic staff and the student. The most relevant clauses of the Study Regulations are introduced to the students at the beginning of their studies during the orientation week, in information classes and in the subject Introduction to the speciality. Counselling and information provide students with explanations of their rights and obligations and the rules for completing the curriculum, incl. the importance of the student's progress deadlines, in order to support their studies and avoid drop-out. Members of academic staff explain students' rights and obligations within the respective subject, incl. the organisation of studies, the schedule and assessment criteria. Study Regulations provide for the procedure for contesting decisions related to educational activities in the event of the parties failing to fulfil their obligations or having erred against the principles of academic ethics. Procedures for contesting are explained to students proactively in information events and within the subjects, as well as on an ongoing basis when questions arise. Students are generally aware of the rules of procedures for where and how to turn to with their questions and concerns. Awareness is indicated by a survey among students (an overview of the results in Chapter ***3.10. Study support systems***), according to which 70% of the respondents are aware of the support services, incl. study advisers, provided by the University. It is well known that advice and assistance can be sought from the University support units, such as the Department of Academic Affairs and the Department of Organisation of Studies responsible for curricula, as well as the Student Union, tutors and course supervisors. The process of resolving questions or challenges related to grades or assessment procedure and principles is somewhat more complex, the rules of which students may not always know in detail. In these cases, students have been informed that they have to contact the study organisation specialists or the director of academic studies.

Developing academic staff assessment competence

The quality of teaching/studies is of great relevance for the University. To ensure quality, it is necessary to have resources, incl. competent qualified academic staff. The University fully contributes to and supports developing the competence of its academic staff. Supporting the development of its membership is one of the most important keywords of the University development plan for the current period. Speciality-specific professional and didactic development is supported through central activities and on the sector basis, incl. the staff own initiatives for professional development. At the beginning of the current period of the development plan (2016–2018), the focus was on didactic professional development of academic staff; the emphasis was on teaching as a whole. From 2019, development of assessment competencies is more in focus. At the University, courses and training for academic staff (further information in Chapter ***3.6. Academic staff***) were organised by the educational technologist and other specialists from the Department of Academic Affairs, as well as the Language Centre, and collaborating academic staff from other universities (e.g. University of Tartu, Tallinn University). Academic staff are offered personal consultations and counselling. Academic staff have the opportunity to find courses and training according to their needs, the costs of which are covered by the ASTRA program or the funds allocated to the University Personnel Department. The Vice-Rector for Academic Affairs reserve has funds to ensure the quality of teaching/studies, which chairs and institutes can use primarily to organise courses and training, development seminars or workshops on assessment of learning outcomes, e.g. in December 2019 the Chair of Biodiversity and Nature Tourism organised training for its lecturers with a collaborating lecturer from the University of Tartu.

Strengths, areas for improvement and planned development activities

Strengths	
• Students assessment is relevant and output based • Feedback in learning process is supportive; high satisfaction of students with feedback to support learning provided by the academic staff • PhD student evaluation supports PhD student development	
Areas for improvement	**Planned activities**
• More efficient and purposeful implementation of formative assessment in larger study groups	• Organising experience sharing seminars and training for academic staff involved in formative assessment

3.10. STUDY SUPPORT SYSTEMS

The University provides students with academic, career and psychological counselling, to support students in adapting to their studies, during their studies, progress in their studies, and in preventing and reducing drop-out. Study support system is multi-level and with several focus points. Support is provided by the University staff: Department of Academic Affairs specialists, study organisation specialists, directors of academic studies, curriculum heads, course supervisors, ERASMUS coordinators, career specialists, psychologists, as well as fellow students: tutors, buddies, members of the Student Union. Tutors and buddies who are ready to support fellow students are prepared at tutor trainings for Estonian and foreign students. Students can get information about counselling services from social media (Facebook, Instagram, etc.), the University website, study information system ÕIS, TV screens in study buildings, information sessions at the beginning of the academic year, the first-year students' orientation event “University and you”, various information seminars and subjects.

Students' academic progress is constantly monitored and supported at the University. The study regulation specialists advise students in compiling study plans, incl. the possible special needs or educational abilities and preferences, and assists in matters of the classes schedule, choosing the study group and application for RPL. Students with special needs are supported by the admissions officer and the psychologist, and at the institute level by the director of academic studies, the study regulation specialist and academic staff. The University has mapped the curricula (*in Estonian*), for enabling students with special needs to make choices, and this information is taken into account when compiling the student's study plan. Special needs that affect a specific subject, are discussed with the members of academic staff. Students with reduced mobility are considered in the selection of auditoriums, and a bus is ordered for trips to enterprises, laboratory assistants are involved in chemistry laboratory work as support persons; alternative digital materials are offered to people with hearing and visual impairments, etc. To take into account the individual

educational abilities of students, academic staff applies different teaching methods, incl. project or research-based approach, in order to maximise students' individual abilities differently, provide direct feedback and provide additional guidance if necessary. As an alternative to face-to-face study, simultaneous e-learning is allowed. Due to the limitations and obstacles caused by the spread of the coronavirus, academic staff has started to use alternative approaches in study process more than before. With very short notice, studies had to be completely reorganised in 2020 and distance learning launched. Study process based on contact/face-to-face learning had to be reorganised as distance learning, using digital technology and tools, digital learning materials, e-learning and study videos. Achieving learning outcomes also had to be monitored with e-tools (e.g. Moodle). It has been an unexpected challenge for both the students and the University, nevertheless, it created new choices and opportunities to achieve learning outcomes, and developed students' general and key competences, incl. time and self-management, independence, digital competences.

Career counselling

The issue of finding a job becomes relevant for students mostly in the last academic year before graduating, when they start preparing for the professional career, but there are also cases when students, especially foreign students, wish and need to find a job earlier. In matters related to a professional career and finding a job, the student receives advice from the head of the curriculum and staff at the institute, as well as from the career specialist, who assists students in preparing the necessary documents. Due to the Estonian language proficiency requirements, the opportunities for foreign students to find a job are somewhat more limited. International students are supported in their job searches by the University international relations specialists in collaboration with career specialists and Tartu Welcome Centre; contacts with the University's partner enterprises are also helpful. In the autumn of 2021, the University started collaboration with the Baltic Research Institute, which helps students from third countries to find jobs. Once a year, the University organises a career day "Student Fair", where students can get information about enterprises and find practice opportunities and jobs. Seminars and trainings take place during the Career Day; representatives and specialists of institutions and enterprises from various fields are present as guest lecturers, also individual advice and assistance is provided to students in choosing practice opportunities and jobs, and in career planning. During the crisis of COVID-19, enterprises submitted their practice and job vacancies via the Career Day website *(in Estonian)*. Further information on practice procedures and counselling in Chapter ***3.7. Curriculum*** and Chapter ***3.8. Learning and teaching***.

Psychological counselling

At the University, students are supported in their mental health issues by two psychologists who advise students with problems in their studies or personal lives and recommend preventive activities and events to maintain their mental health. Psychological counselling service is free of charge for students, incl. international students, students with special needs and PhD students. If necessary, the psychologist refers the person to a medical specialist and mediates the problems that have arisen in the studies, with the consent of the student, to the corresponding specialist of the institute. Information on psychological counselling is available on the University website, also specified in introductory subjects and events and in information seminars. International students will be introduced to the service during orientation week, which includes psychological training to support adaptation and coping with change. Since autumn 2020, an orientation week takes place for Estonian students as well, which includes a psychologist introducing the counselling service.

The Student Union, in collaboration with a psychologist and a career specialist, organises various thematic seminars, incl. preventive ones, on coping with stress, time management, motivation and ability to concentrate, etc., according to the interests and wishes of students. Due to the COVID-19 pandemic, seminars in this format were somewhat in the background in 2020, but in the spring of 2021, a project was launched in the initiative of veterinary students to raise students' awareness on how to maintain mental health and prevent more serious mental health problems. Several events were organised during the week, and the project continued in the autumn semester of 2021.

Foreign students support and counselling

Foreign students support and counselling is multi-level, as is the support and counselling for Estonian students. Support is provided by psychologists, career specialists and fellow buddies. For effective functioning of the buddy's' system, the University has developed tutor training that also covers aspects of different cultures. In matters related to studies and the speciality, foreign students are advised by international relations specialists in the Department of Academic Affairs and Erasmus+ program coordinators at the institute. MTÜ Tartu Welcome Centre also provides support and help. Twice a year, before the beginning of the semester, the University organises an orientation week for international students to get information about study opportunities, leisure opportunities, the city of Tartu, Estonian culture, customs and places. International Club, which has been operating at the University since 2011, organises various events for international students and foreign lecturers. Speciality-related associations make a very big contribution. Student Union events are bilingual and a good opportunity to involve foreign students in student life.

Student drop-out

Academic, career and psychological counselling, supporting students in adapting to their studies, during their studies, progress in their studies, and in preventing and reducing drop-out is aimed for preventing and reducing student drop-out. Drop-out could be prevented even more effectively if the University were aware of the real reasons why students drop out. The University tries to find out the reasons by sending inquiries to students who have dropped out about the reasons for not going on with their studies. Personal Data Protection Act limits the University's possibilities to find out the real reasons, and in many cases students do not disclose the reasons for leaving. Students mention personal and economic reasons, wrong choice of speciality and having a job. In some cases, the answers are more comprehensive, describing the bottlenecks of the University, incl. the curricula - this information is passed on to the heads of curricula and subject teachers. In 2019, the question about the reason of dropping out was answered by 24.5% of exmatriculated students and in 2020, 28.9% of drop-out students. 27% of the respondents cited work commitments, 15% a change of interest, 11% family commitments, 11% a wrong choice of speciality, and 11% health-related factors as the reason for leaving. 4% of the respondents mentioned transfer to distance learning as the reason for leaving.

In order to avoid drop-out due to curricula, the descriptions of curricula have been modified and updated. The content and purpose of curricula, incl. career opportunities, are presented in more detail so that student candidates can decide on the suitability of the curriculum before applying. The requirement of a letter of motivation is applied to the curricula of "Veterinary Medicine" and "Food Technology" to attract motivated student candidates. As a result, the drop-out rate in the first semester of the "Food Technology" curriculum has decreased: 2019/2020 – 15.8% of students matriculated, 2020/2021 – 8.3%. Based on feedback from students, incl. those who dropped out of studies, the share of speciality studies was increased for the first academic year and general subjects were linked to the speciality module. This change highlighted the link between the studies and the speciality. The content of the subject "Introduction to the speciality" of the University first level curricula has been modified, harmonised and made more targeted. The course is divided over the whole semester to support students in their studies and progress. The curriculum for "Rural Entrepreneurship and Financial Management", "Veterinary Medicine" and "Civil Engineering (Rural Building)" has piloted a system of course tutors, which has been warmly received by students and many insecure students have therefore found help and motivation to continue their studies. In order to alleviate the economic difficulties due to the COVID-19 pandemic, the University allows students to pay the invoice for reimbursement of study expenses issued due to study debts incurred during the completion of the curriculum on the basis of a payment schedule. If debts have arisen due to the crisis, students have not been reimbursed (no invoices issued). Since autumn 2019, the study organisation of the University enables students to participate in studies during their academic leave.

Due to preventive activities, incl. student counselling and curriculum development, slight decrease in drop-out rates can be observed, especially in the fields of engineering, production and construction. **Table 22** shows the share of drop-outs in the first semester and the first academic year at the University as a whole, and separately in curricula "Technotronics" and "Civil Engineering (Rural Building)". Even though the **Table 22** shows that the drop-out rate in the first semester and the first academic year has remained at the same level on average (9% and 21%, respectively), the aforementioned curricula show reduced numbers,

e.g. in “Civil Engineering (Rural Building)” the drop-out rates have decreased from 35% to 13% in the first year, and in “Technotronics” from 50% to 39%. Significant difference can be noticed in drop-outs of the first semester of “Technotronics”, which has fallen from the previous 29% to 8%.

Table 22. Proportion of drop-out in the first semester and the first academic year (%) at the University as a whole and separately in “Technotronics” curriculum and “Civil Engineering (Rural Building)” curriculum in 2017–2020

Year*	Percentage of drop-out (%) of admitted students		Percentage of drop-out (%) in “Civil Engineering (Rural Building)”		Percentage of drop-out (%) in “Technotronics”	
	1st term	1st academic year	1st term	1st academic year	1st term	1st academic year
2017	7,7	20,5	20,7	34,5	29,2	50
2018	12,1	23,9	6,1	24,2	8,6	25,7
2019	7,7	17,4	3,03	18,2	5,6	36,1
2020	9,3	22,7	12,8	12,8	8,3	38,8
Mean:	**9,2**	**21,1**				

[1]*admissions 11.11.n-1…10.11.n studying 1st course 10.11.n (n=year)*

According to the administrative agreement concluded between the University and the Estonian Ministry of Education and Research (2019–2021), the University was obliged to reduce the share of drop-outs in professional higher education and civil engineering to the University average. The University has complied with this requirement and will continue to take steps to reduce drop-outs in the first year of study already.

Until the spring of 2020, the number of drop-outs in higher education decreased in general (**Figure 16**); at Estonian University of Life Sciences (**Figure 16** and **Table 2**) as well as at other major Estonian universities (**Figure 16**). The share of drop-outs is also decreasing year by year in the field of studies in engineering, production and construction (**Figure 17**). However, the COVID-19 pandemic has led to an increase in university drop-outs, according to 2020/2021 number of drop-outs (**Table 2**).

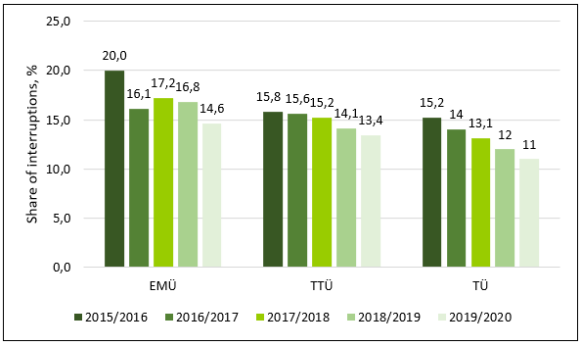

Figure 16. Proportion of drop-outs (%) for the academic years 2015/2016–2019/2020. Drop-out: 11.11.n-1 to 10.11.n.

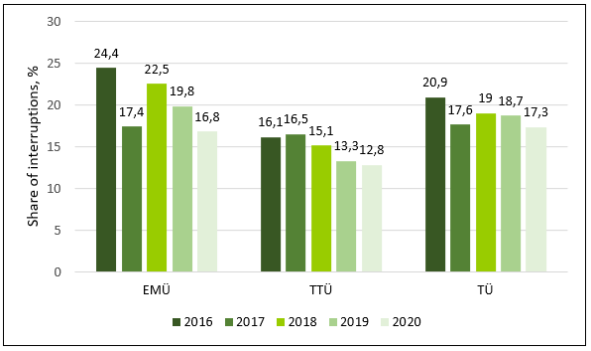

Figure 17. Proportion of drop-outs (%) in broad group of studies: engineering, manufacturing and construction.

Preventive measures and activities and development of curricula have had a positive effect on the efficiency of studies, and students are motivated to complete their studies with a nominal study period. The longest study period is still in PhD studies, but it has been shortened to 5.5 years in 2016–2020 compared to 2013–2017 (average 6.3 years). Students in veterinary medicine graduate during the prescribed study period (6.0 years). Average study time at the bachelor's level is 3.2 years and 2.2 years at the master's level. A slightly longer period of study (by one year on average) is required to complete the professional higher education curriculum (4.3 years) and the civil engineering curriculum (5.7 years), due to their obligation to serve in the Military Service.

Literature, materials and other teaching/study aids

The University has up-to-date and relevant study and research literature and study materials for teaching/studies and research, development and creative activities. Academic staff responsible for the subjects take care of relevance of the study materials and literature, also contribute as authors of study literature, incl. university textbooks. In 2016–2020, the University staff published 39 university textbooks and study materials as publications or hard copies and 70 web publications, which are available in the

University's research library or in the libraries of structural units. With the compulsory distance learning in 2021, educational videos have become indispensable learning materials. As part of the innovative teaching methods measure of the ASTRA project, more attention was paid to preparing problem-based teaching/study materials until 2021, after which the share of the production of educational videos increased significantly. The study materials, incl. both compulsory and recommended ones, which are needed to support achieving the learning outcomes, are stored in ÕIS, Moodle or the University cloud environment. Thematic websites (e.g. Weebly application TE.0960 Physics for Engineers I),), blogs, Google Classroom, Google Drive and other web environments are used to share learning materials. Academic staff is obliged to organise and update the syllabus and study materials before the beginning of each semester. The University monitors the quality of study materials through student feedback and internal assessment of subjects and curricula. Further on literature, materials and other teaching/study aids in Chapter ***3.2. Resources***.

Information and communication technology solutions to support educational activities

The University uses the study information system (ÕIS) as an information exchange environment for study organisation. ÕIS comprises information on curricula (objectives, learning outcomes), subjects (objectives, learning outcomes, timetable, study materials, e-environments for the study process, conditions for access to assessment, assessment methods and criteria), lesson and examination plans, student results, student status and academic staff. Through ÕIS, students apply for speciality and performance student grants, PhD student grants; register for subjects and exams, and receive information on the organisation of studies. Study Regulations regulate the obligations and rights of ÕIS users. University members, incl. students, are required to have the University user account and e-mail address (Chapter ***3.2. Resources***). The University uses the WebDesktop document management system to manage, use, search and forward documents. The University information systems are interfaced for more convenient use of the systems and more efficient transmission of information. The document management system is used by the University staff, students have limited access according to their function, such as participation in the University decision-making bodies and committees.

The University uses a variety of digital tools (e.g. digital whiteboards, padlets) and e-learning environments to support studies and enrich teaching/study methods. The most widely used e-learning environment is Harno Moodle, in which the integrated content creation tool H5P is increasingly used by lecturers. Google Classroom e-learning environment is used somewhat less. In addition to e-learning environments, the use of BigBlueButton, MS Teams and Zoom online environments for lectures, seminars, workshops, etc. has increased over the past year and a half. Until February 2022, the University will have the Wooclap application for engaging students and getting feedback, alongside the online presentation platforms Zeetings and Poll Everywhere. The use of digital tools and e-learning environments has expanded exponentially during the coronavirus pandemic, and staff who have used digital tools more passively in the past have also found an indispensable tool in digital versions. The number of Moodle e-courses alone increased from 84 in 2018 to 589 in 2020 (**Table 23**).

Table 23. Number of Moodle courses 2016–2020

Year	2016	2017	2018	2019	2020	30.09.2021
Courses	87	45	84	254	389	435

Even though the use of digital tools and e-environments supports and enriches learning, it does provide academic staff with food for thought and challenges on how to prevent academic fraud and identify unauthorised aid in e-learning process. In addition to the possibilities of e-learning environments, the University has used the electronic assessment monitoring system Proctorio since spring of 2021. The software was tested in the final exams of the "Veterinary medicine" curriculum. The University uses the plagiarism detection system Ouriginal to monitor academic fraud, incl. preventing plagiarism.

Using IT and digital tools and e-environments in the learning process is advised and supported by an educational technologist, who organises general and individual training and counselling, and prepares instructional materials for staff, but students also ask for help, which is why IT guides have been prepared for both target groups and are available on the university website. Within subjects, academic staff advises students on the use of study environments. Due to the widespread use of distance learning, a Moodle course is being developed for first year students who have no previous exposure to Moodle environment. The

educational technology solutions used in the study process are also introduced to students during the orientation week.

Extracurricular activities

The University supports the participation of students in extracurricular activities and civil society initiatives at the level of the Rector's Office and institutes, providing students with facilities and resources for events and activities of societies, e.g. the Engineering Students Association and the Estonian Forestry Students Association. Activities and events are supported by providing rooms, equipment and, if possible, financial support. The Institute of Technology supports the Engineering Students Association in participating in the compressed air vehicles project and in international competitions. The University budget provides funds for the Student Union for organising activities and events. Various projects and the International Club are funded for events for international students and staff. The staff of the Department of Academic Affairs helps to implement student initiatives. In collaboration with the University of Tartu, students' cultural collectives are supported through *MTÜ Tartu Üliõpilasmaja* (Non-Profit Association Tartu Student Club). The University supports students' sports within the curriculum subject "Physical culture" by paying membership fees to the EMÜ Sports Club. Two successful students in sports are recognized with a sports scholarship (1000 euros per student per year) and exemption from dormitory fee. Athletic results as an active contribution to society are also taken into account for the University admissions (Chapter ***3.8. Learning and teaching***).

The Student Union regularly organises calls for project proposals, thus students can apply for funding to implement their ideas and activities. In 2016–2021, the Student Union funded the following projects:

- Estonian Landscape Architecture Students Association: benches with planting boxes and seating areas (in process). The wooden seating benches in the campus are an earlier project of the association.
- Environmental Protection Student Association: environmental awareness days;
- Estonian Veterinary Medicine Students Association: surgery society;
- Society of Engineering Students Association: pneumobile and other projects related to engineering;
- Estonian Forest Students Association: lecture series "Forestry stories by foresters", Järvselja summer games.

Students also participate in the events of the Green University working group, the most popular of which is the annual physical activity challenge. At the initiative of the members of the Green University, a community garden was established in the University campus in the spring of 2021, where foreign students actively participate.

Students satisfaction with support and counselling services

Students satisfaction with support and counselling services is monitored by the University *via* feedback, giving the grounds for modifying and improving the services according to the results of the feedback. Satisfaction with support and counselling services is part of the feedback given to subjects and curricula in ÕIS. The psychologist and the career specialist ask for feedback immediately after counselling. In the spring of 2020, under the leadership of the Department of Academic Affairs, career specialists gathered feedback from first-year students in the field of engineering and technology through an oral survey to map the reasons for dropping out of studies in this field, and on satisfaction with support services and study regulation. At the collaboration meeting of study specialists of Department of Academic Affairs, directors of academic affairs and the Student Union in December 2019, the feedback was analysed and thoughts and ideas for more efficient implementation of the University support systems and the Student Union were exchanged. In 2020/2021, spring semester, a satisfaction survey was conducted among students of Estonian taught curricula to map both awareness and satisfaction with career and study organisation services and counselling, with psychologists, tutors, Student Union and IT support. The survey will be conducted every two years. The survey showed that at least 70% of students are aware of support services, the services are available and help to cope at the University. The quality of services and satisfaction with the services (study, career and psychological counselling, Student Union, tutors, educational technology and IT support) was rated as rather good (on a 5-point scale, an average of 3.8; IT support 4.5). As part of the survey, students provided information the University can use to develop services and improve the study support system. The results of the survey were presented in the units related to the services, and improvement activities

were planned in collaboration. As an improvement activity, the University hired a second psychologist, as the feedback from the students showed that the waiting list for the psychologist was too long. Based on the feedback, first-year students are offered more help than before to get involved in the University life and study activities, incl. getting a clear idea of the curriculum. The University psychologist, career specialist, specialists of the Department of Academic Affairs, incl. the educational technologist, visited each institute first-year students to share the necessary information related to the study activities. Earlier it was organised as an inter-university info-seminar. Teaching how to use the ÕIS has been made more personal. The impact of the improvement activities is assessed on an ongoing basis and in 2022/2023, when a new study will be carried out.

A feedback survey is conducted every year among international students who are studying or have practical training at the University for at least three months, with questions about the quality of study and support services, and students can share their impressions of their academic mobility. In 2020/2021, 91% of foreign students who have been at the University for at least three months responded to the feedback survey. In the feedback, students can also point out the staff and subjects that provided a particularly positive experience, and, of course, the subjects where the collaboration did not go so well. At the end of each semester, the Department of Academic Affairs forwards the received feedback to the institutes. General student satisfaction is rather high. Small study groups, the personal and warm approach of the academic and administrative staff and the opportunity to apply knowledge and skills in practice have repeatedly been brought out. Issues to improve that have been brought out in feedback: conditions of the dormitory, ensuring a uniformly high level of study quality and greater attention of local students to those who have come to study from abroad. International students point out the activities of the coordinators as very positive about the University support services, and it is mentioned that solutions to all their studies and more personal issues had been found, and the approach of the specialists was personal. Students who have used the services of a psychologist are satisfied. Concerns include the dormitory's internet connection and the lack of a place on campus where students can socialise in the evenings, for example to study in groups and study for exams.

Strengths, areas for improvement and planned development activities

<table>
<tr><th colspan="2">Strengths</th></tr>
<tr><td colspan="2">• Study process is supported; students, incl. foreign students are provided with academic, career and psychological counselling
• Study support system is multi-level and with several focus points
• Effective collaboration between students and faculty on the use of digital solutions and tools, digital learning materials and e-learning in a distance learning crises during the COVID-19 pandemic
• Up-to-date and relevant teaching materials and information and communication technology tools</td></tr>
<tr><th>Areas for improvement</th><th>Planned activities</th></tr>
<tr><td>• More effective monitoring and prevention of drop-out
• International students' job opportunities</td><td>• Wider application of the system of course supervisors in curricula to prevent drop-out and monitoring students' progress during the semester, incl. mid-term assessment, and intervention if necessary
• Providing employment opportunities for international students in cooperation with the Baltic Research Institute</td></tr>
</table>

3.11. RESEARCH, DEVELOPMENT AND/OR CREATIVE ACTIVITIES

Strategic objectives for research and development (hereinafter: R&D), incl. basic and applied research as provided for in Organisation of Research and Development Act, are formulated in the University development plan 2015–2025. The aim of the University is research at international level and the objective is to reach at least one of the internationally accepted world university rankings.

International consultancy company QS Intelligence Unit list *QS World University Rankings by Subject* has ranked Estonian University of Life Sciences at the range 51–100 in the field of Agricultural Sciences and Forestry, which is the highest ranking of Estonian universities. According to the rating agency *Times Higher Education*, Estonian University of Life Sciences is one of the 1000 best universities in the world, ranking between 801 and 1,000. In the field of plant and animal sciences and the environment and ecology, the University is among the 1% of the most cited research institutions in the world.

The University R&D objectives and priorities are determined by the mission of the University, the expectations of the society and future needs, and formulated in the Research and Development Strategy until 2025 "Knowledge-based bio-economy". The strategy supports the University mission – The University creates and shares knowledge to the promotors of bio-economy for the best of Nature and Man – and is in accordance with the aims and objectives of the University development plan: to contribute to the sustainable use of natural resources, sustainability of the environment, coping with climate change, preserving biodiversity, ensuring food security, production of safe and healthy food, and regional development of Estonia through a value chain approach to the bioeconomy. The selection of R&D priorities is based on global and European Union trends, incl. the UN Sustainable Development Goals, European Green Agreement, national strategies and the fact that Estonian University of Life Sciences is the only university in Estonia whose main areas of study and research comprehensively comprise the issues of sustainable use of primary resources necessary for life and preservation of the living environment. The R&D strategy sets general and specific sectoral objectives for R&D, activities for implementing the strategy and indicators for monitoring fulfilment of strategic objectives and development directions and trends.

To more effectively organise R&D and academic studies based on it, and considering the possibilities and needs of research and study groups as a whole, chairs have been established, headed by an ordinary professor responsible for the level and development of their academic activity responsibility area (Chapter ***3.1***. ***Strategic management***). To implement the activities of responsibility areas and ensure sustainability, the task of the chairs is to introduce students to the research results and the latest research achievements in the respective field through the research, innovation and education system and to involve students in R&D projects (**Appendix 9, Appendix 18** and **Appendix 27**). As a result of the activities of the chairs, the international visibility and competitiveness of the University, the number of publications and the income from research and development activities have increased (**Figure 18**).

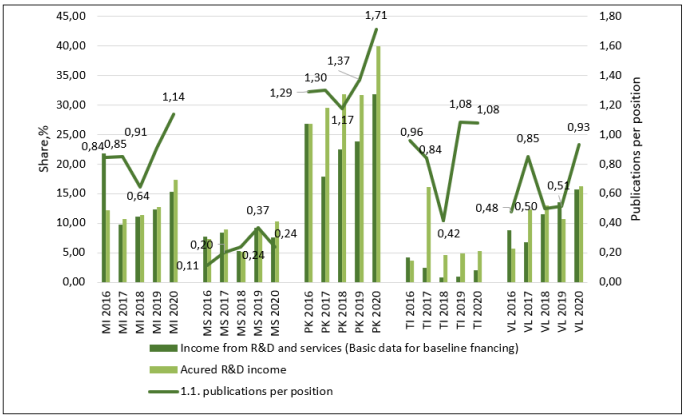

Figure 18. Number of publications, income from R&D and services (according to basic data on baseline funding) and accrued income from R&D in institutes 2016–2020.

To increase multidisciplinarity and improve collaboration, the academic activity responsibility areas are concentrated in six focus areas: agriculture, forestry, environment, engineering and technology, health and food, and rural economics. One or two intra-university focus area seminars are organised each year, involving as many staff members and students as possible. Suggestions discussed during the seminars and solutions agreed upon are used for planning R&D and they are the basis for preparing annual action plans, also for amending the University legislative acts. R&D seminars are organised to address other current topics as well, such as R&D funding, the University career model, intellectual property, data management plan and open research, research information systems, academic ethics to increase the University membership awareness of key processes in the institution, ability to see the University as a whole and consider future development needs. New action plan for the development plan focused on developing the circular and green economy capacity in the University to ensure competitiveness in the growth areas of smart specialisation, to provide companies with innovative and comprehensive product development and consulting services, and to prepare the University graduates optimally for the labour market.

Regular external R&D evaluation in 2017 resulted in all three research fields of the University receiving a positive decision - life sciences, engineering and technology, agricultural sciences and veterinary medicine.

Estonian Ministry of Education and Research uses source data on baseline funding collected on the basis of the same criteria when comparing the efficiency of universities' R&D, and allocates funds to universities for baseline funding according to these data (**Figure 19**). The following data are compared across universities: a) 1.1. scientific articles, monographs and their chapters, patents and plant varieties; b) PhD defences; c) R&D accrued income.

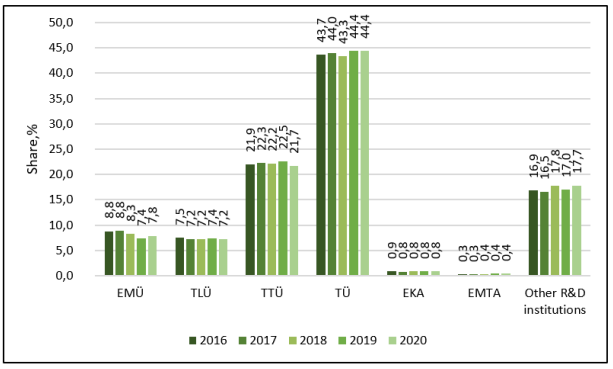

Figure 19. Share of baseline funding in universities and other R&D institutions in 2016–2020. (TLÜ – Tallinn University, TTÜ – Tallinn University of Technology, TÜ – University of Tartu, EKA – Estonian Academy of Arts, EMTA – Estonian Academy of Music and Theatre)

In the University use of the R&D baseline funding finances are regulated by Procedure for use of baseline funding of research and development activities. According to the procedure, the University supports applicants for research grants if the application has received a high grade in the application round organised by the Estonian Research Council, but did not receive funding. The University allocates baseline funding to the equipment and apparatus depreciation fund, the development fund, and chairs and institutes. Fulfilment of R&D activities and the achievement of the objectives defined in the action plan of the University annual development plan are assessed according to the target levels of the indicators specified in Clause 4.3. of the Research and Development Strategy until 2025 "Knowledge-Based Bioeconomy" (**Figure 19, Figure 20, Figure 21**).

Achievement of the research and development objectives of the action plan of the development plan was successful in 2016–2020, as seven of the eight target levels were met. Only total income per academic staff member was lower than planned (**Table 3**). International visibility and competitiveness of the University has increased and international publishing has increased significantly since 2019 (**Figure 20**) in total number and in terms of number calculated per full-time academic staff.

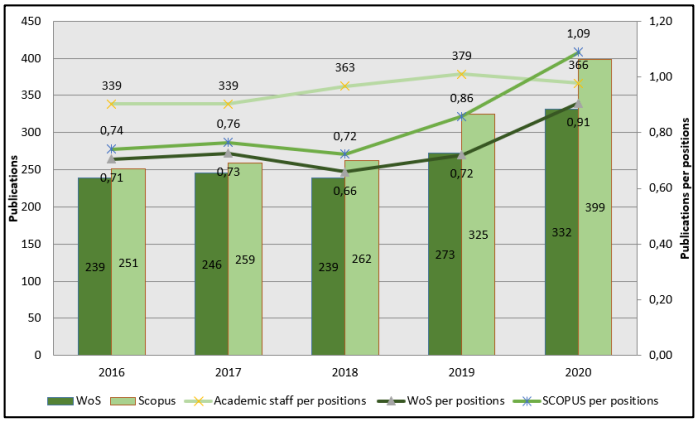

Figure 20. Total number of publications (WoS and Scopus) and number per academic employee in 2016–2020 in full-time equivalent.

Volume of R&D funding, incl. domestic and international contracts, has increased (**Figure 21**). As for international contracts, it is worth noting that the University was one of the five most substantially funded grantees in Estonia in 2014–2020 from the funding program Horizon 2020.

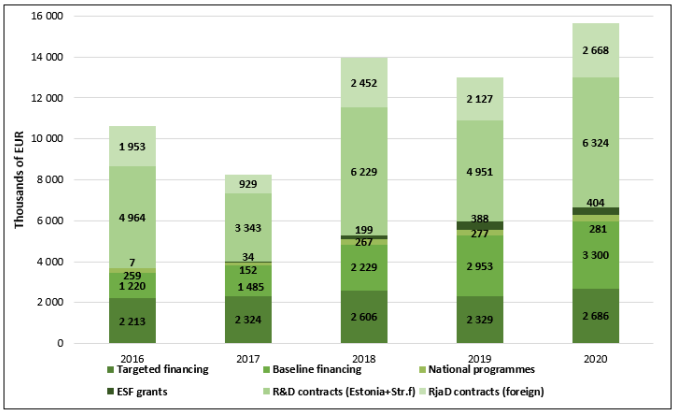

Figure 21. R&D revenues in 2016–2020 on the basis of the University budget report.

Since 2016, the University has been leading the Centre of Excellence EcolChange, the partner being the University of Tartu. The Centre of Excellence has been allocated 4,437 thousand EUR for seven years (2016–2023), of which 95% by the European Regional Development Fund.

The University actively participates in the following international cooperation networks: COST Actions; CORE Organic ERA-NET Functional biodiversity in Agriculture; A Long-Term Biodiversity; Ecosystem and Awareness Research Network; BEENOVA; Integrated control in oilseed crops; Education and Research in Biosystems Engineering in Europe; Wind Energy Cluster; Nordic Association of Agricultural Scientists; Baltic Sea Universities network; Ecosystem Health & Sustainable Agriculture; Nordic Network of Agriculture and Food Ethics; Nordic Network in Social Evolution, NOVA, BOVA.

The University has a functioning R&D support system, incl. a system for dealing with and advising on intellectual property, whereas the organisation and management of the support system takes into account the mission and sectoral differences of the University. The task of the Department of Research and Development is to coordinate implementation of R&D and innovation policy, involving staff and students, to provide support services necessary for fulfilling the objectives of the main R&D processes and to coordinate activities related to the development of the University. The unit Nature Collections has been established to support R&D. To promote collaboration of the structural units of the University, to develop innovative activities, to improve the management of R&D and to improve the quality of support services, the University has established interdisciplinary science and technology transfer units. The Centre of Bioeconomy supports the vision of the University to be an internationally recognised research university in the field of bioeconomy, with the objective of initiating and developing R&D activities in the field of bio-, circular and green economy and to find additional funding opportunities. The aim of the Centre of Renewable Energy is to initiate and develop interdisciplinary R&D activities in the field of renewable energy. The main activities of the Research Centre of Organic Farming are scientific and applied research in organic farming, introducing environmentally friendly lifestyles and organic food, training various target groups and finding solutions for developing organic sector in collaboration with entrepreneurs. The Research Centre of Organic Farming provides scholarships to reward research on organic farming. The University Development Fund has been established to promote collaboration, with the objective of supporting the University capability of implementing value chain based and innovative projects in the fields of bioeconomy. Interdisciplinary science and technology transfer units Station for Measuring Ecosystem-Atmosphere Relations (SMEAR), Järvselja Training and Experimental Forestry Centre *(in Estonia)*, Polli Horticultural Research Centre, Märja Experimental Farm, Rõhu Experimental Station, provide the necessary infrastructure and support services for field experiments and collaboration with companies.

To strengthen collaboration with enterprises, the University actively participates in the annual cooperation festival and entrepreneurship week, organises sectoral seminars with researchers, enterprises and representatives of the third sector in the respective field of R&D and is a partner in the activities of the ADAPTER business cooperation platform. ADAPTER is a platform for business cooperation between Estonian R&D institutions, the aim of which is to offer companies a quick and easy opportunity to cooperate with Estonian universities, colleges and other R&D institutions. The University regularly updates research services for enterprises. To better coordinate the sectoral collaboration of R&D, a Territorial-

Spatial Development Plan (*in Estonian*) and a database of equipment and apparatus (*in Estonian*) have been created to increase the efficiency of equipment and apparatus usage.

The University staff participate as opinion leaders in guiding the development processes of society in professional and speciality associations and advisory bodies (Chapter ***3.12. Service to society***).

Strengths, areas for improvement and planned development activities

Strengths	
• Chairs integrate implementing activities in the academic activity responsibility areas, ensuring sustainability, and research, innovation and training systems • As many staff members and students as possible will be involved in developing R&D strategies. Various stakeholders are involved in preparing strategically significant projects • Collaboration in the fields of bio-, circular and green economy is supported by the University development fund • Interdisciplinary units and centres and ADAPTER business cooperation platform support knowledge and technology transfer • Effective collaboration in international cooperation networks, professional speciality associations and organisations • Constant increase in the number of international research publications per full-time equivalent of an academic staff member	
Areas for improvement	**Planned activities**
• Reducing negative effects of project-based funding	• Creating more stable funding opportunities

3.12. SERVICE TO SOCIETY

The compact and multifunctional campus of the University is a business card to the City of Tartu, located on the border of the city in a spectacular location by the Emajõgi River. The campus is open to public. All membership of the University is involved in the activities aimed at the society.

Contribution to development of community well-being by the University

The University campus and units library, animal clinic *(in Estonian)*, sports club, Järvselja Training and Experimental Forestry Centre *(in Estonian)*, Polli Horticultural Research Centre, Rõhu Experimental Station, Võrtsjärve Study Centre *(in Estonian)*, Nature Collections, SA Research Centre of Organic Farming, Centre of Bioeconomy and Torni hostel provide necessary services to the public, from treatment of animals to sports facilities.

The University **Library** is open to academic membership and readers outside the University, who make up 55% of the library's users, being interested in scientific literature, final theses and fiction. Library is an important cultural unit, organising various events from book presentations to exhibitions. The University **Animal Clinic** is the base of clinical practice for veterinary students and a medical institution that treats farm, wild and pet animals and birds, as well as exotic animals and birds. Animal Clinic often receives positive media coverage *(in Estonian)*. The clinic collaborates with other animal clinics and the Tallinn Zoo, and employs internationally recognised veterinarians whose professional activities extend even to Africa. Järvselja Training and Experimental Forestry Centre has the mission of promoting higher education in forestry and scientific research and experimental work in the field of forestry in Estonia. The experimental forestry is located in forests in the natural state, where you can experience wildlife on study paths open to anyone interested. Järvselja Forestry grows and sells seedlings and saplings of trees and shrubs. Järvselja hunting lodge can be rented for events and the dormitory for accommodation. Quite a sight at Järvselja is the Station for Measuring Ecosystem-Atmosphere Relations (**SMEAR)** mast. **Polli Horticultural Research Centre** activities include breeding and horticultural research on fruit trees and berry bushes, seedlings and saplings are grown for sale. **Polli** and **Rõhu** organise information and study events for the public. **Plantvalor** (*in Estonian*) competence centre offers companies the know-how and the possibility of using equipment to enhance and fully utilise plant material in food and non-food products. In the **lake museum** of the Võrtsjärve Learning Centre one can get acquainted with the biota of Estonian inland waters, incl. freshwater fish; fishing camps are organised for children in summer. Booked in advance and during various events, one can visit the University's life science collections, the most popular of which are: **soil museum** and anatomy collection (*in Estonian*) of the Zoomedicum. **Sports Club** offers a variety of training opportunities for the University staff, students and all other sports enthusiasts. The share of the sports club's non-university customers has increased year by year (from 23.6% to 33.2%). The **Research Centre of Organic Farming** introduces environmentally friendly lifestyles and organic food to entrepreneurs, schools and kindergartens.

Aula, the festive hall of the University main building and the premises of the study buildings are rented for holding events, incl. conferences and seminars, primarily by the University's partners Estonian Chamber of Agriculture and Commerce, Baltic Agro AS, the Rapool Estonia office and others. The University dormitories and the Torni Hostel can be used for accommodation. The Green University initiative working group, especially with the help of foreign students, started a community garden in the campus, which offers eye-catching and exciting discoveries to public as well. The campus has discgolf park and lit ski trail in winter. The University participates in the Tartu Smart Bike Share project: using bicycles in two bicycle parks located in the campus allows fast movement between study buildings and good connection to the city centre. The campus provides the "park and drive" option, i.e. the University offers everyone the opportunity to park their car in the University car park and take a coach from the campus to Tallinn.

The University organises information events, seminars, conferences and trainings for the public. Theses defences at the University are generally public and the theses are available in the digital archives of the library DSpace. Information about defences and other events can be found on the University website and events calendar. In 2018–2021, a total of about 640 events were held for the public and the annual number of participants was approximately 15,000. Since the spring of 2020, many events have taken place online or as hybrid events, i.e. partly on-site and partly online.

MTÜ Tartu Student Club, which was founded in 1999, brings together 12 groups of the University of Life Sciences and the University of Tartu, who perform at significant University and public events. The groups include the University staff, students and non-university members.

Visibility of the University in society

The University staff participate in the work of professional speciality and trade associations and as experts in social advisory and decision-making bodies (approx. 250 associations and unions) and guide the development processes and decisions of society as opinion leaders. The University professors belong to the steering committee tasked with working out the national Forestry Development Plan, the steering committee and subcommittees for the development plan for the environment until 2030, under the responsibility of the Estonian Ministry of the Environment. The University researchers participate as experts in the work of the research council, established in June 2021, of the Estonian Chamber of Agriculture and Commerce.

The University research and results are presented at information seminars and conferences, incl. internationally, as publications, incl. popular science publications, and in media, incl. television, radio and social media. Approximately 3,000 media items are found per year about the University, and the University publishes more than 120 popular science articles. To celebrate the 100th anniversary of the Republic of Estonia, the University called for "100 research articles in Estonian", and in 2018–2019 the staff published 123 research articles in Estonian on topics related to their field. The articles can be found in a collection *(in Estonian)*, the digital archive DSpace. The library will continue to store the publications, the publications of 2020 are also included in the collection. The publication "From Scientists to Society" introducing the University research services for entrepreneurs and society is published regularly.

Alumni collaboration

The University has more than 27,000 alumni. Alumni are united by the Alumni Association *(in Estonian)* established in 2001, which includes more than 300 alumni. Members of the association are socially active and contribute to promotion and development of the University, belong to the decision-making bodies of the University and collaborate in developing strategies for teaching/studies, incl. continuing education, as well as research. Alumni are involved in curriculum development committees, teaching/studies, promoting and marketing specialities. A large proportion of alumni entrepreneurs offer opportunities for practical training to students. Alumni Association provides scholarships to students who are successful in their studies and active in society.

The major event of the University is the alumni reunion, which is organised in collaboration with the association every five years and is attended by 2500–3000 alumni. The University is proud of its alumni; the graduates work in relevant positions that shape life in Estonia and abroad. Among the alumni are two presidents of the Republic of Estonia: Arnold Rüütel and Alar Karis.

In 2018, the University organised the first meeting for former foreign and exchange students. More than 100 former students arrived, acknowledged the University and gave positive feedback.

Collaboration with enterprises and institutions

The University actively participates in the annual cooperation festival and entrepreneurship week, organises sectoral seminars with researchers, enterprises and representatives of the third sector and is a partner in the activities of the ADAPTER business cooperation platform. Research services (*in Estonian*) for companies are promoted on the University website, and companies can use innovation shares to order research services from the University. Polli Horticultural Research Centre initiated, in collaboration with enterprises, the competence centre for knowledge-based health goods and natural products Plantvalor *(In Estonian).* The centre provides product development services to manufacturers and parties interested in product development. In 2021, the University develops 69 projects in collaboration with enterprises. AS Estonian Cell has ordered research on effect of using Estonian Cell compost as a fertilizer on nitrogen and phosphorus in soil, possible leaching risk and crop yield; Roosiku OÜ on plant based ice cream powders and evaluation of the ice creams.

The University professors and researchers are valued experts and advisors. Risk assessment unit was set up at the Institute of Veterinary Medicine and Animal Sciences in 2015 to provide scientific advice in areas that have a direct or indirect impact on food and forage safety, and animal health and welfare. Around 8–15 expert assessments *(in Estonian)* are formulated a year. The University staff participate as official consultants for Estonian Rural Development Foundation (*in Estonian*).

The biggest success story of 2021 is the launch of BioBlocki® nasal spray to prevent coronavirus. Icosagen Cell Factory OÜ, AS Chemi-Pharm, OÜ Teadus ja Tegu, Estonian University of Life Sciences and the University of Tartu belong to the consortium.

The best collaboration partners are recognised by the University.

Collaboration with schools

The University collaborates with basic schools and upper secondary schools (gymnasiums), incl. Tartu Tamme Gymnasium and Hugo Treffner Gymnasium, and offers students elective courses in the field of nature, engineering and food science, participation in workshops and supervision of research and creative work. The topics of the University fields are also represented in the Estonian Research Agency's annual student creative work competition; the authors of the best student work are recognised with a financial prize and the supervisors with souvenirs. Since 2015, the University offers students the mathematics state exam preparation course.

Students interested in nature have participated in the Science School since 2006. In the first years, students from around Tartu participated, since 2017 participants all over Estonia join the events. Graduates from the school: 2017 – 46, 2018 – 40, 2019 – 28, 2020 – 23 and 2021 – 78 students. Academic years 2020/2021 and 2021/2022 affected the school as well, and thanks to distance learning the participants are from all over Estonia.

The University collaborates with vocational schools and, upon admission, recognizes candidates with an appropriate speciality with extra competition points and admits candidates without competition. In the autumn of 2018, the University entered into collaboration agreements with Olustvere School of Service and Rural Economics, Räpina School of Horticulture, Luua Forestry School and Järva County Vocational Training Centre with the aim of enhancing practical training. Students of the "Civil Engineering (Rural Building)" curriculum get practical training in construction technology at the Tartu Vocational Education Centre.

Continuing education courses and training

The University offers high-quality continuing education in all academic activity responsibility areas, to meet the needs of the labour market. Continuing education courses and training in the University is provided mainly by Open University, also other units.

Continuing education courses and training are registered in the study information system (ÕIS) and certificates are issued to course participants to confirm participation or good results. Information about courses and training can be found on the Open University website and the University events calendar.

Courses and training are organised for different target groups within various programs and projects, free of charge and paid. Participants generally do not pay for custom courses/ training or training for specific projects. The University also offers free training, incl. as part of the University for Families *(in Estonian)* project for the general public and as part of long-term agricultural knowledge transfer programs (PIP) and as part of procurement of labour market measures, etc. At the end of continuing education courses and training, participants are asked for written feedback, the results of which will form the basis for developing and organising further programs and training. Participants in 2016–2020 were very satisfied with organisation and professional skills of staff, on a 5-point scale, the rate is mostly between 4 and 5 points.

In 2014–2020 the University participated in different sub-programs of PIP *(in Estonian)* and was the lead partner in horticulture and cooperation sub-programs. In 2021–2023 the University participates in all measures of the so-called JointPIP and leads the cooperation sub-program. Conferences, information events, seminars, continuing education courses and training, etc., are organised, information materials prepared. Activities of the program, courses and training are organised by the Open University and the chairs. University for Families *(in Estonian)* organised courses and training are supported from the national measure to promote science.

Number of continuing education courses and training and participants has increased over the last five years (**Table 24**). Although the number of events decreased somewhat due to the coronavirus pandemic, the number of participants increased due to online courses and training. During this period, most training was provided in the field of food safety and veterinary medicine. Most events were in Estonian, some in Russian or English. Agricultural training for Ukrainian entrepreneurs was organised within the framework of development projects supported by Estonian Ministry of Foreign Affairs in 2015–2017 and 2017–2019. Demand for continuing education in foreign languages, especially in Russian, is indicated, therefore it has become an important area for development.

Table 24. Number of Open University continuing education courses and participants in 2016–2020

2016		2017		2018		2019		2020	
Participants	Courses	Participants	Courses	Participants	Courses	Participants	Courses	Participants	Courses
1833	84	2452	140	2396	120	2371	135	2739	121

Further education students have the opportunity of completing subjects of formal education for a fee at the University. In 2020, 16 students participated in subjects of formal education (seven in 2019). The number is modest, mainly due to the free study opportunities offered in the field of rural life (PIP program, study at vocational schools) and free higher education.

As a new opportunity, the University offers microcrade programs *(in Estonian)* at the Open University from 2021, which gives students a microcrade certificate. The aim of the program is to involve interested participants to the study of formal education curricula. In the autumn of 2021, the University initiated continuing education collaboration with the Ülemiste City business park to offer continuing education programs to the local business community.

To recognise the work done, the Continuing Education Trainer of the Year is awarded according to the Statute of Awards and Recognition.

Strengths, areas for improvement and planned development activities

Strengths	
• Continuing education courses and training takes into account practical and target group needs; target groups are satisfied • Effective collaboration with enterprises • Campus offers activities and leisure opportunities • The University regularly organises local and international conferences, seminars and other information events to present the research achievements	
Areas for improvement	**Planned activities**
• Increasing the share of continuing education courses and training, incl. market-based training and formal education curriculum modules • Insufficient marketing of subjects of formal education to society • Developing outdoor area: more interactivity by setting up seating, outdoor gyms, etc	• Increasing training and dissemination of information on future topics such as renewable energy, robotics, engineering and green economy • More active marketing of subjects of formal education; developing and implementing microcredit programs • Creating continuing education courses and training modules taught in English; expanding the activities of Open University, incl. to international level • Implementing process of planning the spaces of the University campus in collaboration with the City of Tartu to ensure a compact, green-oriented study, recreation, events and sports area

4. CURRICULUM SELF-EVALUATION

4.1. ENVIRONMENTAL PROTECTION

Curriculum, studies	Environmental Protection, BSc
Structural unit responsible for the curriculum	Institute of Agricultural and Environmental Sciences, Chair of Environmental Protection and Landscape Management
Curriculum self-analysis preparation facilitator Head of Curriculum / program manager	Pille Tomson, Senior Lecturer pille.tomson@emu.ee
The process of preparing the curriculum self-analysis and report	The process of preparing the curriculum self-analysis and report started with forming the working group: Head of Chair, Professor Kalev Sepp; Head of Curriculum, Senior Lecturer Pille Tomson; Assistant Professor Monika Suškevičs; Senior Lecturer Ivar Ojaste; study specialist Lagle Lõhmus; student representatives Laura Pipper and Grete Lucia Kruuse; employers representative Kaili Viilma. Academic staff, students and alumni were involved to provide input. The tasks in the working group were divided among the members, and the working group was led by Professor Kalev Sepp. Support and feedback during the preparation of the report was received from the quality manager.

4.1.1. Planning and management of studies

The administrative agreement between the Estonian Ministry of Education and Research, and the Estonian University of Life Sciences gives the University the responsibility to develop environmental protection curricula and prepare environmental specialists in Estonia. Environmental protection is one of the main responsibility areas of the University. The Chair of Environmental Protection and Landscape Management (hereinafter: the chair) is responsible for the development and quality of the bachelor's curriculum "Environmental Protection". Curriculum development considers the expectations of students and other stakeholders, sectoral development trends, the needs of the labour market, incl. recommendations of the survey "Water and waste management and environment" (OSKA, 2019) on the skills and labour needed for the development of the Estonian economy, and good international practice. The curriculum is based on up-to-date sectoral know-how and research. Curriculum development is led by the head of the curriculum and the curriculum committee. Representatives of employers and students are involved in the work of the curriculum committee. Major changes were made to the curriculum in 2019, when the objectives and learning outcomes of the curriculum were updated. The subjects were grouped into modules, i.e. targeted clusters based on learning outcomes, and the learning outcomes of the subjects were more clearly linked to

the learning outcomes of the curriculum. The volume of practical training was increased in the curriculum and the "Entrepreneurship" module and the subject "Basics of bioeconomy" were integrated into the curriculum.

The objective of the curriculum (**Appendix 1**). is to prepare specialists with diverse knowledge of the effects of natural processes and human activities on biodiversity, landscapes and the human living environment; knowledge of environmental management, nature protection, usage of landscape and natural resources, spatial and landscape planning and measures to improve the state of the environment. Students who complete the curriculum are competent to work as nature and environmental protection specialists in the field of environmental management and planning and nature protection, and to continue studies at the master's level. Students' professional competence is supported by the general competencies acquired during the studies, the development of which is closely integrated with speciality studies. The general module general competencies subject "Academic success and learning skills" are directed at acquiring the skills of critical thinking, Environmental sociology at developing social competencies, and "Environmental philosophy and ethics" at developing cultural and value-based competencies. Students' study skills are developed in the subject "Academic success and study skills" and entrepreneurial competence in the sub-module "Entrepreneurship".

Among the elective subjects, students can choose the subject "Project preparation and management", where, among other things, independent and systematic thinking and the ability to make considered decisions are developed, and the subject "Communication psychology", where, among other things, self-development and teamwork skills are developed. One of the most important competencies in the field of environmental protection is digital competence in using various geoinformation systems.

Bachelor's curriculum "Environmental Protection" is aimed at acquiring the principles of environmental protection and sustainable development. The subjects of the curriculum "General course in environmental protection" and "Environmental indicators and databases" deal with the UN Sustainable Development Goals. The curriculum is implemented in accordance with the Green University strategy of Estonian University of Life Sciences until 2025, and students in the curriculum participate in the Green University initiative events and campaigns. Many students belong to Environmental Protection Students' Association, which is the leader of environmental events both at the University and in society.

The objectives of the curriculum and its modules, learning outcomes, theoretical and practical learning, incl. practical training, and the assessment of learning outcomes form a coherent whole (**Appendix 1** and **Appendix 7**). Practical training has an important role in achieving the objectives of the curriculum: in the opinion of the students, passing the subject "Environmental protection and practical training of landscape management" (6 ECTS) in enterprises has provided very good experience in applying what has been learned in practical tasks and enabled to understand what needs to be paid more attention to in further studies. Students also see practical training as an opportunity to establish initial professional contacts that will help them in their future career decisions. As an improvement proposal, it is suggested that the practical training could be longer.

The principles of organising practical training are described in Chapter ***3.8. Learning and teaching***. Finding an enterprise for practical training within the curriculum is generally the task of the student, on the principle that after entering the labour market after graduation, the student has gained the necessary experience of looking for a job. Students who do not find an enterprise for practical training will be assisted by a University supervisor. Practical training is based on a contract between the student, the enterprise and the University. The enterprise supervisor may be an employee with higher education and/or long-term work experience in the respective field. The enterprise practical training supervisor is advised by the University practical training supervisor, who receives feedback on the content and effectiveness of the process from the practical training report submitted by the student and approved by the enterprise practical training supervisor, and the enterprise practical training supervisor's answers in the feedback questionnaire. Within the framework of the ESF project, the University has organised practical training for the enterprise practical training supervisors (see Chapter ***3.7. Curriculum***). The Institute of Agricultural and Environmental Sciences has a very good cooperation relationship with the Ministry of Rural Affairs, the Ministry of Environment, the Environmental Board, the Environmental Agency, several municipalities and companies, who provide good opportunities for practical training and several framework cooperation agreements are

in place. During the COVID-19 pandemic in 2020 and 2021, students were, as an exception, allowed to do the enterprise-practice at the chair, where alternative speciality related activities were offered.

The flexibility of the curriculum is ensured by elective and optional subjects, which allow the student to make choices based on speciality/professional or personal interests. It is possible to choose from the subjects of the University or other Estonian universities and foreign higher education institutions, and students actively use this wide choice. The structure of the curriculum supports student mobility and enables to involve foreign students, as several specialities are taught in English. Generally, the international mobility of students in the first stage of higher education is rather modest; however, in the "Environmental Protection" curriculum students are more active and at least one to two students' study abroad each academic year; also during the COVID-19 pandemic in 2020, two students participated in mobility.

The expected workload per student for 1 ECTS is 26 hours in the curriculum. Students feedback has suggested some subjects need to be modified, e.g. Geoinformatics I, Land surveying and cartography, From idea to business plan, in which the students find the workload is not corresponding to the number of subject credits. Analysis and modification of correspondence between the volume of workload and the number of credits has been initiated for these subjects.

Curriculum development is an ongoing process and requires, among other things, financial resources. The financial overview of the chair responsible for the educational activities of the curriculum is presented in **Table 25**. The goals and objectives of the academic activities are defined in the development plan of the responsibility area for environmental protection and landscape management of the Institute of Agricultural and Environmental Sciences for 2019–2025 (hereinafter: PKKK development plan *(in Estonian)*. Even though the volume of financing educational activities allocated to universities has not increased in the last five years, the chair has been successful in applying for research and implementation projects. Therefore, the total income of the chair has increased from 815,410 euros (2016) to 1,283,987 euros (2020), the total income per academic employee from 27,025 euros (2016) to 40,225 euros (2020). The chair is constantly working on about 20 projects, and such a workload makes it possible to keep the salaries of academic staff competitive and mitigates the risks of reduced funding. When applying for projects, it is ensured that research and development topics support educational activities. The main financial supporters of applied research have been the Estonian Research Council, Ministry of Environment, State Forest Management Centre, and the Environmental Investment Centre and several international projects (Interreg, Life+, Biodiversa, Horizon 2020, ERA-Net, Cost-Action).

Table 25. Overview of financing Chair of Environmental Protection and Landscape Management (2016–2020)

Year	Number of academic staff members*	Number of R&D contracts	Total revenue (EUR)	Total revenue per academic staff member*
2016	12.2	13	815,410	66,837
2017	12.2	14	867,586	71,114
2018	13.45	17	944,724	70,240
2019	12.35	21	1,189,856	96,345
2020	12.75	22	1,283,987	100,704

*full-time equivalent

Diversity of funding sources ensures the stable and ongoing financing of the chair and the sustainability of the curriculum. Tuition fees make up about 30% of the total income of the chair, research funds 30% and implementation projects 40%. The chair manages the biogas laboratory and the remote sensing laboratory, as well as the technical equipment for field work (bird migration telemetry equipment, portable environmental quality analysis equipment, DGPS equipment, etc.). Successful application for projects and the growing volume of environmental research have enabled to increase R&D revenues. Due to climate change and other global environmental crises, environmental issues are increasingly important to society, therefore there is an increased demand for specialists with environmental training, which in turn fosters the number of applicants to the curriculum, and competition for study places is rising.

The necessary study and research literature in the curriculum for conducting studies is available, kept up-to-date and relevant by the chair's resources. Students have access to both the University and the institute's library. Access to major research databases is provided through the University library. A more detailed overview of the possibilities of the University library is provided in Chapter ***3.2. Resources***. The practical

use of research databases and work with scientific literature is included in the curriculum subjects "Research methodology" and "Environmental indicators and databases" and the bachelor's thesis.

One of the objectives of the University development plan and the institute development plan until 2025 *(in Estonian)* is modern learning-friendly environment, whereas establishing recreation and study spaces for students was a priority in the 2016–2020 period of the institute development plan already. Under the leadership of the Student Union, a vision and plan was drawn up to improve the opportunities and living conditions for students to work independently in the study buildings; which were discussed across the University, as well as at the institute council and chair meetings. Student recreation spaces with high-speed internet access and snack vending machines were established in the study buildings. Students have access to desktop computers for public use. There are spaces and places for independent work, incl. group work, in the University and institute library. The campus provides opportunities for outdoor learning and recreation. Environmental Protection Students' Association has its own premises in the Forestry Building. According to the students who participated in the curriculum self-analysis working group, they are satisfied with the living conditions, but there is need for additional space where they can study and focus in a quiet environment. The students also appreciated the social learning environment, but pointed out that there is less sense of unity, probably due to the spread of the coronavirus in recent years. The University implements as many face-to-face and / or hybrid courses as possible, following the safety measures, and offers online individual consultations.

Strengths, areas for improvement and planned development activities

Strengths	
• The curriculum has been regularly reviewed and updated in order to reflect the needs of the labour market; the development and evaluation process for the curriculum involves students, employers and the University representatives • The curriculum has a good balanced structure where basic natural scientific topics are followed with more practical management topics and students highly value the mixture of different courses and topics • Good opportunities for practical training – several framework cooperation agreements are in place • The chair has sufficient funding due to successful project applications; funding sources are diverse • The speciality is topical and necessary for society	
Areas for improvement	**Planned activities**
• Students wish to have more practical assignments in the courses and even more internship possibilities • Correspondence of workload and credits in some subjects • Social learning environment and sense of unity; further development of student recreation and study areas • Curriculum modification based on society's expectations and future needs	• To develop larger, more coherent courses in order to reduce the fragmented nature of the overall program and to obtain improved integration of knowledge and skills • Subject development in cooperation with enterprises • Regular meetings of academic staff, student representatives, and administration at the end of each semester to discuss teaching/studies issues (volume, methods, content, coherence of courses, etc.) • Establishing a room for studies for students in Forestry Building • More effective implementation of learning methods to promote socialisation and teamwork in learning process • Updating subjects and topics according to the needs of society (remote sensing, big data, climate neutrality, bioeconomy, ecosystem services, etc.; more efficient use of chair laboratories in teaching/studies)

4.1.2. Learning, teaching and assessment

The University **admission procedure and requirements** are described in Chapter ***3.8. Learning and teaching***. Student candidates are admitted to the curriculum on the basis of admission results ranking, i.e. the prerequisites for the candidates to succeed in the curriculum are assessed on the basis of the results of Estonian state examinations. Without competition, graduates of the upper secondary school with a gold or silver medal, participants in international or national subject olympiads and finalists in the TV science program/competition "Rocket 69" are admitted to the bachelor's study curriculum "Environmental Protection". Interest in the curriculum has been very high in recent years and the number of people interested has been steadily increasing. The competition for the curriculum was 6.18 in 2017 and even 11.24 in 2021 (9.26 in 2020; 7.18 in 2019; 5.78 in 2018). Great interest in the curriculum and admission

requirements enable admitting motivated students whose prerequisites for coping with the curriculum are sufficient.

The individual abilities and needs of students are taken into account in the **study process**. In issues of study organisation, students are supported by a study organisation specialist; if necessary, the director of academic affairs of the institute can be contacted. In issues of problems or difficulties in passing the subjects, the student first turns to the member of academic staff teaching the subject, who helps to find solutions and, if necessary, reorganise the studies, taking into account the student's individual abilities, or offers additional consultations. Individual consultations have also been needed during distance learning due to the COVID-19 pandemic. For valid reasons, it is possible to agree on individual deadlines for independent work. Support for Russian-speaking students often requires attention. Students whose mother tongue is not Estonian can take for free the Estonian language courses offered by the University Language Centre. Relevant information is provided to first-year students at the beginning of the first semester. In some cases, the students are allowed to use a dictionary for the exam. In the case of written assignments/tests, if possible, spelling and grammar errors in the work of non-Estonian-speaking students are not assessed, the content is focused on; or an oral examination is provided instead of a written examination. To determine the level of students' knowledge, diagnostic tests are taken before the start of the subject course, and, if necessary, additional study materials are provided to the students. Additional speciality-related literature is provided to more motivated and professionally interested students.

The teaching methods used in the study process are diverse and allow to take into account the individual abilities of students. Instead of regular lectures, many members of academic staff prefer to use the lecture-seminar form, discussions, surveys, group assignments, etc. as active learning methods. Practicums are conducted in laboratories (subject "Pollutants in the environment" (**Appendix 6**) and computer labs ("Geoinformatics I" (**Appendix 5**) and "Formation of Estonian cultural landscape"). Several subjects include field trips (subjects "Landscape management", "Formation of Estonian cultural landscape", "Estonian nature geography", "Nature based tourism", "Environmental indicators and databases"). Some subjects can be taken as fully e-subjects in the Moodle environment ("Land surveying and cartography" and "Geoinformatics I" (**Appendix 5**)). Problem-based learning is applied in some subjects ("Introduction to environmental protection" (**Appendix 2**), "Environmental policy and management", "Spatial planning" (**Appendix 3**)), as well as case study, project preparation, analysis of research articles, preparation of reports and essays, etc., both as group and individual work. Courses and training (Chapter ***3.2. Resources*** and Chapter ***3.6. Academic staff***) have been organised for academic staff to encourage using effective teaching methods, incl. "Tests and tasks in Moodle" and "Assessment in a Moodle course" in 2021. Learning outcomes, oral and written feedback by students to the academic staff during the studies and at the end of the course *via* the study information system (ÕIS) are relevant components in assessing the effectiveness of the teaching methods.

To improve the quality of **teaching/studies**, the staff members collaborate and exchange experiences. In the subject "Landscape management and maintenance II", students are assessed by three members of academic staff. The curriculum staff discussed collectively what should be paid more attention to when writing written independent work in the subject "Research methodology". As a result of the discussion, the subject was moved 'up' in the curriculum, so that students would acquire the skills required for writing and organising text earlier.

Digital solutions and tools have been used considerably more due to the Covid-19 pandemic. In many subjects, hybrid teaching was applied in the autumn term of 2021, i.e. the teaching took place both in the auditorium and online. In the spring terms of 2020 and 2021, teaching/studies were conducted as distance learning *via* digital tools, with only a few practical tasks in the subjects "Geoinformatics I" and "Pollutants in the environment". The institute conducted a survey among curriculum staff to map and assess the use of digital solutions. 78% of the respondents used the Big Blue Button as the University video bridge, 44% used the resources of the Moodle environment. Youtube options were mainly used as additional materials and to illustrate the lectures. Less, but still to some extent, the staff used the tools Zeeting and Mentimeter that provide options for short feedback and short answers, the applications Doodle, Slack, Google Forms and others for planning course assignments. The results of the survey showed that 58% of the curriculum staff rated their digital skills as good or very good, 37% as good or satisfactory and 5% as poor. To develop

digital skills, the University educational technologist has organised several courses where participation of the staff of the chair has been high.

Feedback is highly relevant in teaching/studies. For thorough and more complicated written assignments detailed instructions are available. If necessary, the academic staff provide additional explanations by e-mail or at consultations, incl. *via* a video bridge. Feedback to students is given orally mainly at seminars; in writing, e.g., on Moodle assignments or students' written work. Feedback from fellow students is often used in the learning process. At the beginning of the supervision of the bachelor's theses, the stages of the theses, methodology, schedule and frequency of meetings are agreed upon with the student. Meetings with the supervisor(s) take place on a regular basis and current issues are discussed or feedback is given on an ongoing basis by email, telephone or video bridge. Supervisors have highlighted the students' inability to stick to the schedule when compiling their theses.

Students' **volume of independent work** corresponds to the number of credits of the subject, its correspondence to the actual workload is monitored in ÕIS on the basis of feedback given by students. The issue of the volume of independent work was discussed by the academic staff in the meetings, held by the modules of the curriculum. If it turns out that the workload of the subject is greater than the number of credits, the academic staff will make corrections in the workload in the next academic year. If necessary, the number of credits will be increased: in 2021, it was suggested to increase the number of credits in the subjects "Pollutants in the environment", "Environmental ecology", "Environmental policy and management", and to reduce the credits in the subject "Geoinformatics I".

Students are actively involved in **research and development** and projects. In most cases, the involvement is related to the student's bachelor's thesis, and the student can collect data or analyse the collected data by participating in projects. Six bachelor's theses defended in the spring of 2021 were directly related to research and development projects. Student participation in projects in 2017–2021 is presented in the **Appendix 9**. The students participating in the curriculum self-analysis working group suggested that the readiness of students to participate in research and development is different, i.e. some want to and some do not, but the members of the Environmental Protection Students' Association participating in the 2021 chair development seminar were of the opinion that students should be involved more.

Students are supported in progress of their studies by the institute's study regulation specialists, tutors, psychologists and career counsellor, who they meet with at the beginning of the first academic year as part of the orientation week to introduce students to study organisation, support services and the role of tutors. Students can turn to a study regulation specialist with questions about studies. Study regulation specialists also monitor students' progress and, if necessary, draw the staff attention to problems or issues for which solutions are sought together. Students are supported and represented by the Student Union. Student Union also organises motivational seminars and training for students on mental health issues.

Students are introduced to the principles of the code of conduct for **academic ethics** within the framework of activities of the orientation week and several subjects. If problems or questions arise, the student has the opportunity to contact a study regulation specialist and the director of academic studies of the institute. Further on academic ethics in Chapter ***3.4. Academic ethics*.**

The reasons for drop-out are different – health, economic or family related – but the most common are the wrong choice of profession or lack of motivation. The student may lack the skills and motivation to study independently and, as a result, debts in studies pile up that are hard to work through.

Drop-out share in the bachelor's curriculum of "Environmental Protection" has been on a downward trend in recent years (**Table 26**).

Table 26. Completion of curriculum and drop-out in the bachelor's curriculum of "Environmental Protection"

Year of admission	Admissions	Graduates	incl. nominal period	Graduates nominal + 1 year	Drop-outs	incl. drop-outs during 1st term	1st academic year drop-outs	Graduates from admissions (%)	Drop-outs from admissions (%)
2013/2014	46	19	19		27	7	16	**41.3**	**58.7**
2014/2015	40	21	18	3	19	6	12	**52.5**	**47.5**
2015/2016	36	15	13	2	20	2	9	**41.7**	**55.6**
2016/2017	37	14	14		19	5	13	**37.8**	**51.4**
2017/2018	38	21	18	21	13	2	8	**55.2**	**34.2**
2018/2019	34	19	19	-	12	3	10	**55.8**	**35.3**
2019/2020	32				9	6	9	-	**35.4**
2020/2021	33				10	6	10	-	-

To prevent drop-out, students are counselled by study regulations specialists, head of curriculum and career specialist. In cases of lack of motivation or mental health issues, the students are supported by psychologists. The student's progress in studies is monitored by a study regulation specialist, who advises on difficulties with studies and other issues related to studies. The reasons for drop-outs are analysed by both the institute and the chair, and the Department of Academic Affairs at the University level. The results of the analyses are presented at the development seminars of the institute and the chair. In order to prevent drop-out, curricula are analysed, incl. the connections between subjects and the curriculum, the speciality content and general subjects and study results.

To assess **curriculum graduate's employment and continuation of studies**, a feedback survey was conducted in the spring of 2021 among the alumni who graduated in 2018–2020 (20 of the 50 respondents answered). The results of the survey showed that half of the respondents continue their studies at the University in the master's curriculum "Environmental Policy and Management" and half of them work, or work and study simultaneously. Most alumni work in speciality-related jobs. According to the responses, the acquired higher education, professional speciality knowledge and skills, as well as practical experience gained within the framework of professional practice and internships helped to find a job. Alumni also highly valued the general competencies acquired at the University, incl. analysing and solving problems, teamwork, and the skills of taking initiative and responsibility. The majority of respondents are satisfied with the curriculum and it met their expectations. The diversity of subjects, practice and internships, as well as the support of the chair were pointed out as positive. As areas for improvement, recommendations were suggested to increase the volume of practical training and diversify internship opportunities (incl. in the private sector), to more clearly introduce the purpose and content of the curriculum, to integrate a speciality-specific foreign language into teaching/studies, to modernise teaching materials and to collaborate more with other universities for speciality subjects. These suggestions have been taken into account in curriculum development: in 2019, the volume of practical training was increased, practical tasks were included to the subjects "General course of environmental protection", "Environmental policy and management", "Ecological restoration", "Urban ecology and planning", which require content and legal analysis of real life cases and application of digital skills. In 2020–2021, the institute and the chair have significantly increased the financial support to the Environmental Protection Students' Association.

Acquisition of learning outcomes is checked *via* **assessment.** The curriculum includes 26 subjects with graded assessment and 20 subjects with a pass / no pass assessment. Successful completion of previous tests, independent work and/or practicums is a prerequisite for passing the exam in most subjects. Fulfilment of the conditions for taking the exam may not always be related to the final assessment, i.e. it does not affect the final grade, e.g. in the subject Estonian biotopes and their biota (**Appendix 4**). There are 11 subjects in the curriculum for which the results of the independent assignment(s) or mid-term evaluations are related to or affect the final grade. The curriculum also includes subjects in which the final grade is formed on the basis of the work done during the course: in the subject "Landscape maintenance II" the grade is formed on the basis of a landscape maintenance plan prepared as a group work; or the final grade is formed on the basis of mid-term assessment: in the subject "Forest ecology and management" the final grade is determined on the basis of tests. In the case of pass/no pass assessment, an assessment must

generally be taken at the end of the subject. There are 11 pass/no-pass subjects in the curriculum, as well as subjects in which a non-differentiated grade is formed on the basis of current work or mid-term assessments.

Various **assessment methods** are applied depending on the objectives and learning outcomes of subjects. There are also subjects in the curriculum where students can choose between different assessment methods: in the subject "Geoinformatics I" (**Appendix 5**) the student can decide whether to get a grade based on the tasks performed during the course or to take an exam at the end of the subject. Students can also choose topics for independent work. Many subjects use self-testing, intermediate tests and tests, which allow the student to assess their acquired knowledge and skills on an ongoing basis. Assessment tasks are usually developed by the academic staff responsible for the subject. In some subjects (e.g. "Landscape management II"), several lecturers give assessments. Specialists from outside the University are involved in assessment of final theses: in the spring of 2021, 1/3 of the reviewers were from outside the University, one reviewer from another chair of the University.

The weekly meetings of the Chair of Environmental Protection and Landscape Management discuss issues related to assessment, incl. more efficient and frequent implementation of **formative assessment**. Formative assessment is used in the subjects "General course of environmental protection" and "Land surveying and cartography". The main challenge in implementing formative assessment so far has been the size of study groups. An important part of formative assessment is providing individual feedback, which is very labour-intensive for groups of 70–80 students.

Assessment criteria are presented in the course syllabus and are explained to the students at the beginning of the studies and additionally during the studies. In the case of independent work, instructions and assessment criteria are given on the worksheets. At the beginning of the studies, the academic staff find out the expectations of the students and take them into account as far as possible.

The student has the right to contest the grade/assessment by submitting an application to the director of academic affairs in accordance with the procedure specified in the study regulation rules. In the spring of 2021, one student challenged the grade of the thesis, which was positively resolved and the grade was raised.

Strengths, areas for improvement and planned development activities

Strengths	
• High competition for admissions to curriculum • Academic staff uses a variety of teaching/study methods that enable students to acquire knowledge and skills, incl. general competencies • Alumni satisfaction with their education is high; graduates are successful in the labour market • High level of practical work that supports theory in the learning process with opportunities for practical training, thereby increasing the understanding of future career possibilities	
Areas for improvement	**Planned activities**
• Drop-out, low study motivation • Sticking to schedules by students with their theses • More efficient and purposeful implementation of formative assessment in larger study groups • Student involvement in research and development • Issues of coping for Russian-speaking students	• Requirement for a letter of motivation or interview at admissions, considering the main reasons for drop-out • Supervision and modifying the thesis supervision process, incl. schedule and division of tasks, by supervisors, and informing students; introduction of mid-term seminars to support preparation of theses. • Pedagogic skills, new training and assessment methods of lecturers should be developed; organising formative assessment experience seminars and training for academic staff • Organising seminars introducing the chair's research and development activities and projects to students during their studies • Additional introduction to opportunities of learning Estonian language

4.1.3. Development, cooperation and internationalisation of academic staff

To achieve the objectives and learning outcomes of curricula, the University has academic staff with the corresponding qualifications. The bachelor's curriculum "Environmental Protection" involves 40 members

of academic staff (**Appendix 8**), whose average age is 51 years; more than half of them (23) have a PhD or equivalent qualification, 16 members of academic staff have a master's degree and one has a bachelor's degree. The Chair of Environmental Protection and Landscape Management has 32 employees (incl. 10 foreigners) as of 01.09.2021, of whom 47% are women and 53% men. The average age of the staff is 44.6 years. Academic staff in full-time equivalent is 14.4. The academic staff members' positions are as follows: 4 professors, 1 associate professor, 1 assistant professor, 2 senior research fellows, 1 research fellow, 3 senior lecturers, 2 lecturers and 14 PhD students, 7 of whom are part-time junior research fellows. Non-academic positions include a chemist-analyst, chief specialists and specialists. 80% of staff in academic positions have a PhD.

Speciality-related qualification, number, age structure and succession ensure the sustainability of the chair. In the autumn of 2021, 15 PhD students studied in the chair, 8 of whom are foreign PhD students. During the last five years (2016–2020), 111 research articles indexed by ISI Web of Science and SCOPUS have been published in the Chair of Environmental Protection and Landscape Management. The average for the period is 22.2 articles published, thus 1.85 articles per academic staff member per year, which is one of the best indicators in the University and a very good level in international comparison as well.

The teaching workload of academic staff is lower compared to other chairs, which allows the staff be more active in research and work on applied projects. The chair implements the modified career model (see Chapter ***3.6. Academic staff***), therefore M. Suškevičs was elected, as the first person in the University, assistant professor on the tenure path, the chief specialist P. Tomson and lecturer I. Ojaste successfully applied for senior lecturers and associate professor K. Orupõld was evaluated as an associate professor.

Academic staff develop the professional and pedagogical skills Encouraging academic and didactic professional development opportunities and increasing the share of continuing education courses and training is in the development plans of the University and the PKKK. Training topics based on the needs of academic staff are mapped in performance reviews, training needs are also analysed at regular chair meetings and development seminars. All academic staff of the chair have participated in continuing education courses and training in recent years. Most participants join the online trainings that develop digital competencies. There has also been a high level of participation in training for the development of assessment criteria and methods, and in the development of teaching/studies and mentor skills. The impact of the courses and training is measured by the feedback given by the students to the academic staff and subjects. The impact is discussed during the performance reviews. Collaboration and exchange of experiences between the academic staff is very important: the staff of the chair give presentations at the seminars for exchanging experiences and share their professional know-how at the development seminars of the chair. Professional seminars and conferences are important for professional development, and the colleagues who have participated inform about them at regular weekly meetings. To integrate the results of the chair's research into teaching/studies, monthly research seminars were started in 2019. According to the career regulation, academic staff have the right to get a semester free of study (sabbatical leave) once every five years. One academic staff member of the chair has used this opportunity in the last three years. Further information on supporting staff development in Chapter ***3.2. Resources*** and Chapter ***3.6. Academic staff***.

In the learning process, a learner-centred and learning-centred approach to studies is increasingly applied, therefore the above-mentioned (Chapter ***4.1.2. Learning, teaching and assessment***) active learning methods and the collaboration of lecturers are applied. To achieve the learning goals, for example, writing a motivation letter at the beginning of the subject, a study diary in Moodle, setting group work goals and mapping expectations are used. Students are involved in planning their studies, enabling them to choose the topics and forms of independent work; also deadlines are agreed upon in collaboration with academic staff. The Moodle study diary, peer review and self-assessment are used to assess the learning process.

The results of the feedback provided by the students through the study information system (ÕIS) show that the students are generally satisfied with the content and teaching of the subjects of the curriculum and the assessment has been constantly improving **(Figure 22).**

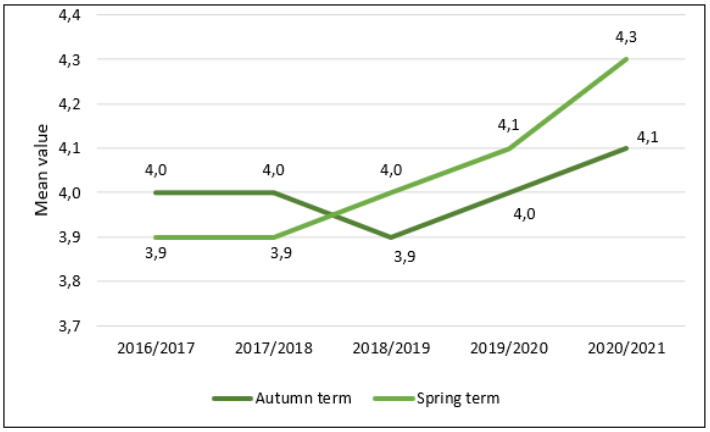

Figure 22. Results of student feedback on subjects of bachelor's curriculum "Environmental Protection" (average grade of subjects rated on a 5-point scale, where 1 not at all satisfied…5 very satisfied), autumn term and spring term.

The results of student feedback are analysed in the Department of Academic Affairs of the University, in the curriculum committee of the curriculum "Environmental Protection", in the meetings of the chair and in the council of the institute. The director of academic affairs or the head of the chair discusses the feedback results with the staff whose feedback ratings have been low or on a downward trend, and improvement activities are agreed upon.

Academic staff follow the principles of academic ethics and the code of conduct in case of non-compliance with these principles. The results of a survey conducted among the staff of the curriculum revealed that 74% of the respondents have been exposed to academic fraud, especially cheating, in their teaching/studies. According to the staff, the number of fraud cases has slightly decreased. One of the reasons could be increase in the awareness of students and teachers and the implementation of plagiarism detection software at the University. The subject "Research Methodology" includes a lecture on academic ethics, which deals with academic integrity, research preparation and the ethic aspects of objects of research, incl. types of plagiarism, causes and possibilities of prevention, and organising interviews and surveys. Principles of Academic Ethics are explained at the beginning of the subjects. To prevent or deter fraud, plagiarism detection software or various techniques are used to validate knowledge, such as time limit, random sampling, different topics for tasks, etc. Lecturers are intolerant of academic fraud and react immediately. In most cases, the student receives a warning from the staff and is given a re-take. In case of repeated or major fraud (plagiarism), a procedure is initiated, as a result of which the student may be exmatriculated.

Internationalisation objectives of the chair are fostered by numerous research and teaching/study projects, such as Horisont 2020, Interreg, Life, Biodiversa, COST, LIFE+, IMAGINE, SABLES BONUS, IRENES and ERASMUS+ program projects SUNRAISE, INTENSE, MARE, ClimEd, URGENT. In the last five years (except due to the coronavirus pandemic in 2020), the number of business trips and the number of staff on business trips have increased. All the academic staff of the chair have been abroad at least once during this period, the average number of business trips per employee is about 2.8 per year. Most trips are related to project meetings, summer schools, lectures and seminars and conferences, followed by research related business trips.

The chair constantly involves foreign staff in teaching: in 2017–2021 professor S. Hall, professor B. Bunce, also ERASMUS+ program exchange staff professor R. Gündoğan from Harrani University and associate professor M. Mesbahzadeh from Teheran University, and C. Joyce and N. Burnside from Brighton University. In 2020–2021, the chair twice organised the course "International Study Visits Environmental Sciences" (2 ECTS, two weeks) for undergraduate students at the University of Wageningen, with the participation of 35 and 40 students, respectively. Students of the curriculum "Environmental Protection" also participated in these courses. Within the framework of ERASMUS + projects SUNRAISE, INTENSE, MARE, ClimED and URGENT summer schools and trainings have been organised, which were also attended by students of the curriculum. The PKKK development plan sets the objective that by 2025 at least 65% of speciality subject studies will involve practitioners or academic staff from outside the University. In 2020/2021, 50% of the speciality subjects of the curriculum involved part-time or full-time practitioners and foreign visiting academic staff. Representatives of ministries and experts from

environmental enterprises, local governments and international organisations, as well as academic staff from other universities participated in teaching/studies.

Participation of all academic staff in research and development ensures research-based teaching/studies, incl. supervision of research. **Academic staff member performance is evaluated and feedback is given** during evaluation, performance review, and evaluation of tenure position performance. Evaluation takes into account effectiveness of teaching/studies as well as research, development and creative work, incl. student feedback, effectiveness of supervision, development of teaching and supervision skills, international mobility and speciality experience or other work experience in a field outside the University. Further information on evaluation of academic staff in Chapter ***3.6. Academic staff***. In 2020, seven academic staff members were evaluated in the chair, two of whom moved to a higher career level. The best teachers are recognized at both the University and institute level. Each year, the institute recognises the best members of academic staff in three fields, incl. environmental protection. Every year, the institute elects the so-called Surprise of the Year. In 2019, the institute recognized one of the staff members of the chair of Environmental Protection and Landscape Management with the title of the Best Member of Academic Staff, and one employee turned out to be the "Surprise of the Year" for the successful management of a large-scale environmental protection project in 2020. The chair motivates employees with an additional bonus at the end of the term according to the work results and contribution. The chair also recognises its staff in various categories (publishing, project work, etc.) at the year-end seminar.

Distribution of the workload of academic staff is agreed upon with the staff and specified in the employment contract, career regulation and job description. The University has established recommended contact/face-to-face classes. The workload of the academic staff is monitored by the head of the chair. According to the rotation of research and applied projects, the tasks and the proportions of activities in the employment contracts must be changed regularly. In general, the workload is evenly distributed among the members of the staff of the chair; however, in recent years uneven distribution of the supervision load of theses has been observed.

The chair and staff participate in the work of professional expert speciality and trade associations and other social advisory and decision-making bodies and guide development processes and decisions of society as opinion leaders. Academic staff publish popular science articles and appear in the media to disseminate environmental know-how in society. Several members of academic staff are actively involved in the work of NGOs, decision-making bodies and working groups on national strategic documents.

Strengths, areas for improvement and planned development activities

Strengths	
• To conduct teaching/studies and ensure the sustainability of the curriculum, the chair has sufficient number of qualified academic staff of appropriate age structure corresponding to the workload • Participation of academic staff in continuing education courses and training has increased • Career model and evaluation of academic staff is purposeful • Practitioners and academic staff from other universities are involved in studies • Internationally active teaching staff, who have experience of working in international teams, teaching and learning in multicultural and multilingual environments • Collaboration networks for joint projects and student exchange	
Areas for improvement	**Planned activities**
• More opportunities for professional development of staff, promoting sabbatical leave • More even academic staff workload distribution of supervising theses • Increasing the proportion of lecturers with PhD degrees	• Developing a support system to facilitate sabbatical leaves and professional development, incl. completing PhD degrees; more effective promotion and communication of sabbatical leave • Regular information seminars to discuss thesis topics and supervision

4.2. ANIMAL SCIENCE

Curriculum title	Animal Science, MSc
Structural unit responsible for the curriculum	Institute of Veterinary Medicine and Animal Sciences
Curriculum self-analysis preparation facilitator, Head of Curriculum / program manager	Marko Kass, Head of Curriculum, marko.kass@emu.ee
The process of preparing the curriculum self-analysis and report	The self-analysis was prepared from May to June 2021. Academic staff from two chairs who are responsible for conducting master's studies were involved in the preparation. The working group meetings took place online. Tasks were divided between the members, the results were compiled and formulated in a single document for content discussions and joint discussion. The process of self-analysis was led by Head of Curriculum, Associate Professor Marko Kass. Professor Haldja Viinalass, Professor Tanel Kaart, Associate Professor Meelis Ots, Associate Professor Ragnar Leming, director of academic affairs Einar Orgmets, lecturers Heli Kiiman, Peep Piirsalu and Alo Tänavots, PhD student Hannelore Kiiver-Pärk, alumnus Karmen Tigas, and Tõnu Põlluäär, representing employers and the Estonian Animal Breeding Association, contributed to preparation and formulating the report.

4.2.1. Planning and management of studies

Estonian University of Life Sciences is the only university in Estonia with research and education in Animal science, providing higher education in animal science at three higher education levels. The objective of the master's curriculum in "Animal science" is to prepare specialists and/or middle managers in the field of animal science in a livestock production enterprise, as an official, private entrepreneur or similar positions. Science and research has an important role in creating the content of the curriculum, research results are integrated into teaching/studies and are the basis for preparing master's theses.

Head of curriculum is responsible for **curriculum development** in collaboration with the curriculum committee, which includes academic staff, students and representatives of entrepreneurs. The curriculum committee meets regularly and at least once a year the content of the curriculum is analysed and updated, the results of student's feedback, recommendations and suggestions by practitioners based on the expectations of the labour market are analysed. Practitioners participating in the study are also regularly asked for feedback. An overview of the curriculum and teaching/studies is given to professional societies and associations such as the Estonian Chamber of Agriculture and Commerce (EPKK), the Estonian Beef Breeders Association, the Estonian Pig Breeding Association, the Animal Breeders' Association of Estonia, the Estonian Native Cattle Breed Society, the Estonian Horse Breeders Society, the Estonian Sport Horse Breeders' Society, the Estonian Sheep and Goat Breeders Association and the Estonian Sheep Breeding Society, who also collaborate in curriculum development. Every year, the representatives of the curriculum meet with the Chamber of Agriculture and Commerce to discuss ways to increase the number of students entering the curricula of agriculture, incl. animal science.

Based on the results of the external evaluation of the curriculum groups in 2016 and suggestions from alumni and employers, an extended working group was formed to develop the "Animal Science" curriculum, which included alumni and employers in addition to the members of the curriculum committee. The working group analysed the learning outcomes of the curriculum and the subjects and their compliance with the needs of the labour market. The updated version of the curriculum (**Appendix 10**) is valid from the admissions in 2019/2020.

The curriculum committee analysed similar curricula at the University of Helsinki, the Swedish University of Agricultural Sciences, the University of Aarhus and the Norwegian University of Life Sciences. As a result of these analysis, the volumes of speciality subjects (e.g. "Beef cattle production") directly related to animal sciences were increased in the curriculum, with a central approach of a focus on one animal species in teaching animal sciences, and better coherence of subjects. In order to reduce the overlap of subjects, the curriculum combines smaller volume subjects into larger ones. Special courses in dairy cattle production, beef cattle production, pig production, sheep and goat production and special courses in horse and poultry production were added to the curriculum (**Appendix 16**).

The curriculum takes into account the specifics of animal science and livestock farming in Estonia, where production is mainly concentrated in larger farms. Therefore, creating a need for animal livestock and farm managers and specialists who, in addition to speciality knowledge and skills, understand economy, production management and planning. Graduates of the curriculum are expected to be able to use digital technologies used in modern livestock production. As a result, the volume of subjects of agro economics and entrepreneurship has been increased in the curriculum, and subjects of labour law and adult education (as a suggested by alumni) have been added as elective subjects.

During the curriculum development, the learning outcomes and content of all subjects were updated, incl. their assessment criteria.

The goals of **UN environmental protection and sustainable development** are followed in the process of curriculum development. The subject "Animal production and environment" objective is to acquire knowledge about the animal-environment and environment-animal interactions, to understand the connections between livestock production and the environment and to prevent possible problems. Environmental issues are also covered in the subjects "Farm buildings and technological equipment", "Animal welfare assessment", as well as in the elective subject "Production of biogas in agriculture".

Practical training has a relevant role in the curriculum. The objective of the subject "Practical training in farm management" is to consolidate theoretical knowledge and acquire skills in livestock production planning, daily work organisation, management and economic aspects that ensure sustainable functioning of the enterprise. As part of the practical training, data are usually collected for master's theses.

Practical training is coordinated by the University's practical training supervisor, who coordinates the student's chosen enterprise and farm practice, assists the student in finding an enterprise, and advises and supports the student during the practical training. Practical training can also be completed abroad through the Erasmus+ program. Practical training takes place on the basis of a contract between three parties, which is signed by the supervisor from the enterprise (e. g. farm), the student and the director of academic affairs of the institute administering the curriculum.

The university supervisor provides the enterprise practical training supervisor with instruction material, which describes the purpose and learning outcomes of the practice and advises him or her on any issues that may arise. The University has organized training for practical training supervisors in all fields. Companies can apply for state practical training (financial) support through PRIA for supervising students of agricultural specialities. After completing the practical training, the enterprise supervisor fills in a feedback form on the student's activities. During practical training, the student completes a practical training diary, prepares a report according to the instruction and gives feedback on the content and organisation of their practical training.

Academic staff of the master's curriculum in "Animal Science" are involved in **research projects,** the results being used in educational activities. If possible, students are involved in the projects and are able to prepare their master's theses within the project, also cooperate with entrepreneurs, which can later be realised into a professional relationship. Students have the opportunity to participate in annual scientific-practical conferences such as "Healthy Animal and Healthy Food", "Veterinary Medicine", EPKK's Annual Milk Forum, EPKK's Annual Meat Forum, etc., and study/training events where the latest research results are introduced and practitioners share their experience.

Involvement of foreign academic staff is based on the needs of the curriculum and previous collaboration with partner universities. For example, in 2019–2021, the subject "Special course in beef cattle production" was taught by foreign academic staff from Finland, Sweden and Great Britain, teaching topics where is modest competence in Estonia. The funds of the institutional development program ASTRA and the Erasmus + program are used to involve foreign lecturers. In cooperation with the Baltic and Nordic universities, the University has organised international courses incl. "Organic Animal Husbandry and Animal Welfare", "Practical Comparative Animal Welfare Assessment" and "Sustainable Pig Production" for master's students within the frameworks of the international networks of universities BOVA and NOVA.

Students have opportunity to participate in lectures given by foreign academic staff invited by professional associations and (local) companies.

Student mobility is coordinated by the Department of Academic Affairs of the University. Students are, at least once a year, introduced to opportunities to participate in student exchange programs. Students have the opportunity to take subjects at other Estonian universities as visiting students.

Working students go on study trips and trade fair visits offered by employers. Through long-term knowledge transfer programs, students working as livestock farmers have the opportunity to participate in workshops and field trips, incl. abroad.

International (visiting) students have the opportunity to participate in the subjects of the curriculum or to act as an intern. The Department of Academic Affairs specialist in international students informs international students about subjects that can be studied in English. The study of international students is mostly individual, as few of them take subjects of animal sciences. Several foreign students have completed their practical training of about five months at the University. International students are involved in research projects.

Sufficient material and financial resources are available for the curriculum, comprising support from the Estonian Ministry of Education and Research and our own resources, as well as the resources of the EU structural funds, incl. from the institutional development program ASTRA, and research funding. In the near future, it is planned to update study aids and acquire new animal dummy models and animal simulation programs. So far, for example a portable pH meter has been purchased, as well as a dry matter meter to assess the quality of forages, e. g. silage. At the University's Experimental Farm in Märja, four cows are equipped with rumen fistulae, which enable students to observe and study degradability in the rumen with different forages and diets in cattle. An optical digital refractometer has been purchased to assess the quality of colostrum and the passive immune status of young stock.

Study and scientific literature and publications are available at the university and chairs (libraries). Academic staff and students have access to research databases and scientific literature (Chapter ***3.2. Resources***). Students have access to speciality-related literature (such as textbooks, theses, conference proceedings) in the chairs. In addition to foreign language speciality publications, study and research literature is available in Estonian, which would help students to get a better understanding of speciality terminology. The staff of the chairs has published the textbooks "Animal Welfare" (2018), "Cattle Reproduction" (2018) and the translated book "Animal Production" (2012), as well as the glossaries "Animal science and production terms" and "Farm Animal Breeds" in Estonian.

In addition to the databases in the chairs (e.g. composition of forages, blood and milk components, genetics, etc.), students have access to information systems such as KOTKAS, EPJ and PRIA on the basis of staff members' application. The use of databases is an integral part of student assignments.

There are auditoriums and laboratories with modern equipment for studies. Students can use the premises of the student society "Taurus" and the premises of the University library. The institute building has seating and recreation areas for students, and a kitchen. Catering facilities are located in other study buildings on the campus.

Strengths, areas for improvement and planned development activities

Strengths	
• Curriculum corresponds to expectations of the labour market and aligns with the UN Sustainable Development Goals • Studies are problem-based and the share of practical training in the curriculum is large • Students are involved in research projects, incl. for master's theses	
Areas for improvement	**Planned activities**
•Developing the learning environment: more efficient implementation of IT and digital solutions •Development of speciality practical training in collaboration with companies and stakeholders	• Regular feedback from alumni and practitioners to find out expectations and needs for IT and digital solutions in order to tailor studies to labour market needs • Organising meetings and collaboration seminars with enterprises and stakeholders to find ways to diversify practices

4.2.2. Learning, teaching and assessment

Admission of students to the "Animal Science" curriculum takes place according to the admission rules approved by the University Senate and according to the admission schedule approved by the Rector's

directive. Admission to master's studies, incl. the “Animal Science” curriculum, takes into account the weighted average grade of studies at the previous study level. For graduates of the specialities of agriculture or biosciences of the previous level of study the final thesis or bachelor's examination is considered instead of the admission test. Students who have completed another field of speciality take an admission test. If a student candidate proves his/her competence in the field of animal sciences on the basis of studies, incl. further and/or higher education or work experience, the admission test is considered to have been passed. The application for considering previous studies and work experience (RPL) is submitted by the candidate to the RPL committee of the institute administering the curriculum for evaluation before the admission period. The RPL committee informs the student candidate and the admissions committee of its decision.

The qualifications and academic degrees of students who have obtained higher education abroad will be assessed by the admissions committee and, if necessary, the ENIC/NARIC centre is involved.

The master's degree curriculum in “Animal Sciences” is marketed centrally by the University; in addition, the chair distributes information to collaboration partners through social media channels and partners web pages e. g. breeding organisations and EPKK. Academic staff of the curriculum appear in the media with interviews and thematic articles, regularly participate in career fairs and knowledge events (at both national and regional levels), and give lectures in professional associations and schools. Students of the curriculum are involved in lectures and talks introducing the curriculum on the university doors-open day.

Since 2018/19 the master's curriculum in “Animal Science” has been carried out in **block mode**. This allows for more flexible academic arrangements, as most candidates have started to work after their bachelor's studies.

Graduates of other curricula, such as agronomy, biology, genetic engineering, etc., may also come to study on the master's degree curriculum in “Animal Science”, therefore, studies in seminars and workshops are organised so that students with more prior knowledge support students in group work who are less familiar with the subject.

If necessary, academic staff can support the students whose previous knowledge of the field is more modest, with individual supervision and counselling. The small number of students enables a more individual approach.

In order to realise the individual interests of students, e.g. an interest in a certain farm animal species, the student can choose the corresponding topic for his/her master's thesis. When choosing electives and practical training in the speciality, the student can consider the species of animal or poultry of interest and the field of livestock production (breeding, nutrition, welfare, behaviour, etc.).

The topics of master's theses are approved by the chair responsible for the curriculum, taking into account the expectations and suggestions of the students. The topics of theses are aligned with the chair's research and development projects and collaboration is established with enterprises. One or more supervisors are assigned to each student (in some cases from other institutes). At regular meetings between supervisor(s) and the master's student is agreed upon and the content and progress of the research are discussed. It is possible for a master's student to apply for study leave from his/her main job while writing the thesis.

Choice of study methods depend on specifics of the subject. When compiling the curriculum and determining the volumes of subjects, the student's study load is monitored so that it meets the requirement of 1 ECTS = 26 hours. In block mode studies, the volume of contact/face-to-face hours is smaller than in full-time studies, which is why the student has to study independently more under the supervision of an academic staff member in order to achieve the learning outcomes of the subject. In addition to working through the lecture materials, students independently prepare research papers and case reports, which are presented and discussed in seminars. Problem-based learning enables the student to develop, among other aspects, the ability to analyse their results and discuss them. An essential part of the study is practical sessions and field trips to enterprises, which supports acquisition of the theory discussed in the lectures. Lectures and seminars are conducted with e-learning and digital technology options (Moodle, Big Blue Button, Zoom, etc.) and specific computer programs. An overview of the teaching/study and assessment methods and criteria used in teaching can be found in the **Appendix 11, Appendix 12, Appendix 13, Appendix 14** and **Appendix 15**. The study materials of the subjects are available to students in ÕIS or in the Moodle environment. It is possible to follow pre-recorded lectures, as well as lectures that have taken

place earlier and recorded. Teachers have good skills in using digital tools. The University offers training in developing digital competencies for teachers (Chapter ***3.2***. ***Resources***).

An important aspect in the study process is **feedback to students.** Students get feedback from the academic staff on the work done in the practical sessions and on their performance in independent work and examination tasks. Students, in turn, can give feedback on the academic staff and the teaching of subjects through ÕIS. Graduating students provide feedback on their supervision and the curriculum as a whole.

Students' assessment is done according to the University Study Regulations, following the principles of the assessment of learning outcomes. Achievement of learning outcomes is usually assessed with oral and written examinations and assessments, tests, reports, essays, group and research work. Academic staff choose the assessment methods and criteria based on learning outcomes and inform students about the methods and criteria at the beginning of the studies. The learning outcomes of the subject and the assessment methods and criteria are described in ÕIS in the subject syllabus.

If a subject includes several members of academic staff, the assessment methods and criteria are coordinated by the member of academic staff responsible for the subject. **Formative assessment** depends to a large extent on the students' prior knowledge and skills, as students may have completed a bachelor's degree in some other speciality. Assessment that supports learning requires analysing the level and development of the learner and setting goals based on this, making changes in the learning process if necessary, and giving the student motivating feedback.

Objectiveness and transparency of assessment is ensured by the academic staff responsible for the subject, whose task is to monitor and coordinate how the staff assess and grade students. The academic staff member introduces the assessment criteria and the components of the grade for each assessment method. The overall grade of the subject is formed on the basis of the assessment results of the academic staff. Academic staff provide written or oral feedback with the grade, so that the student can understand how the grade was awarded. Extra-university specialists with specific knowledge in the respective field are involved in supervising and reviewing theses.

Students can apply for recognition of previous studies and work experience to waive subjects or practical training in the curriculum. Students submit applications for the transfer of subjects to the RPL committee appointed by the director of academic affairs of the institute. The RPL committee decides if transfer is possible and justified; if necessary, the member of academic staff responsible for the respective subject is involved. Work experience is usually considered for replacing practical training, less for subjects, as the skills acquired in working often do not cover the theoretical part of the learning outcomes of the subject.

Student support at the University is ensured with support services. At the institute, students are advised by a study regulation specialist, director of academic affairs and head of the curriculum. Regular meetings with the head of the curriculum take place twice an academic year. The purpose of the meetings is to get feedback from students on their progress and satisfaction with their studies, also information related to the topic and supervision of master's theses. Head of the curriculum informs the head of the chair about the outcomes of these meetings. Students are advised on mobility issues by the Erasmus Coordinator. Psychological and career counselling of students is organised by the Department of Academic Affairs for all University staff and students. Students can also contact the Student Union. The rights and obligations of students are regulated in the Study Regulations. In cases of unfair treatment the students can submit a complaint according to the Rector's directive of 20.04.20 Procedure for processing proposals and complaints.

Drop-out reasons vary, and are, based on the feedback, mainly related to a change of interests, workload and economic situation. Director of academic affairs talks with students who want to leave, and records the nature of the reasons. As many master's students work alongside their studies, the transition to block mode study enables flexibility in organising studies, which has reduced the number of drop-outs (**Table 27**).

Table 27. Number of students, drop-outs and graduates of the master's curriculum in "Animal Science" in academic years 2015/2016–2019/2020

	Academic year				
	2015/2016	2016/2017	2017/2018*	2018/2019	2019/2020
Number of admissions	10	6	0	13	9
Number of drop-outs	2	1	0	9	3
Graduates	8	5	0	0	5

**no admission*

General assessment on **graduates of the curriculum success in labour market is good**. Many students have already found a job in livestock production before starting their master's studies and want to improve their qualifications in the master's studies, which will ensure further career advancement. On average, graduates of the curriculum reach the position of middle manager in five years, e.g. becoming a farm manager. Master's degree graduates are in demand in the labour market. The University alumni work in various (agricultural) enterprises, breeding and feeding companies, the Agriculture and Food Board and ministries as middle managers or top specialists.

Alumni interviews are conducted *via* personal contacts. The changes in the curriculum are partly based on the suggestions of the alumni and are related to developments in the sector. Based on the feedback from the alumni, more practical training and problem-based learning has been included, practitioners are involved in teaching/studies, and the share of speciality subjects is increased in the curriculum. In the course of developing the curriculum, the share of subjects related to relevant livestock production in Estonia, such as beef cattle production and dairy cattle production and horse management was increased. Digital technology was added to the subjects' lists of special courses of specific livestock production. Alumni recommend a course in management psychology on human resource management in the curriculum.

Strengths, areas for improvement and planned development activities

Strengths	
• Practitioners involved in teaching/studies • Top specialists in their field participate in teaching • More than one member of academic staff participates in assessment of students • Individual approach to teaching students	
Areas for improvement	**Planned activities**
• Foreign academic staff involved in teaching/studies • Low number of admissions	• Closer contacts and collaboration to involve more foreign academic staff • Collaboration with professional associations and enterprises to market the curriculum and increase the number of admissions

4.2.3. Development, cooperation and internationalisation of academic staff

Staff qualification, teaching and supervision skills is aimed at academic staff teaching at the master's level having a PhD degree and professional research experience. Academic staff members have PhD degrees (**Appendix 17**), practitioners generally have MSc or equivalent qualification. Age structure of academic staff is evenly distributed between 35 and 65 years, but the succession of academic staff is uneven across sectors. PhD students are admitted to specialities, where research teams are currently small or non-existent.

The main tasks and qualification requirements of academic staff are determined in the Estonian University of Life Sciences Academic Staff Positions regulations. Academic staff have an obligation to improve their didactic skills. Academic staff performance (incl. professional development) is regularly evaluated at evaluations. The qualification requirements for academic staff and the evaluation of their work are described in more detail in Chapter ***3.2. Resources*** and Chapter ***3.6. Academic staff***.

For **professional development** academic staff have the opportunity to regularly participate in internal and external courses and training in their speciality fields and didactics (incl. digital competences) and to participate in international conferences and seminars. In recent years, the chair has paid great attention to courses and training supporting distance learning. In order to improve professional knowledge, it is

important to participate in non-university (international) working groups and decision-making bodies such as HELCOM and EPKK. All academic staff members had the possibility to attend the European Federation of Animal Science (EAAP) Annual Conference in Tallinn in 2017. Most of the academic staff were also involved in organising that Annual conference.

The practical support methods for **beginning members of academic staff** mostly include the member of staff responsible for the subject personally instructing the beginning or practicing member of academic staff on the topics of teaching methods and assessment of learning outcomes. In addition, they are fully supported by the head of the chairs and the director of academic affairs of the institute.

With the support of the Erasmus+ program a guest lecture from Poland taught the subject "Cattle production" in 2017, and with the support of the of the development program ASTRA, guest lecturers from Finland, Sweden and Great Britain taught the subject "Special course in beef cattle production" in 2018–2021.

Members of academic staff appreciate the continuing education courses and training for teaching and supervision skills offered, incl. participation in the international conference "Teaching for learning – the University Perspective" in Tartu in 2018, the course "Supervision and Feedback of Student Research" organised by the University of Tartu in 2019 and the seminar "How to give feedback and how to use students' feedback" in Tartu in 2021.

The Institute of Veterinary Medicine and Animal Sciences regularly organises an annual conferences "Healthy Animals and Healthy Food" *(in Estonian)*, where the academic staff and postgraduate students of the speciality give presentations in their field – animal nutrition and breeding, cattle production, sheep and goat production, pig production, poultry production, herd health management and related fields. Students of the institute participate in the conferences as delegates within the framework of their respective subjects. The academic staff of the institute participated in organising the 2017 annual international conference "The European Federation of Animal Science" (EAAP) in Tallinn.

Mobility information is obtained from the Erasmus+ program coordinator of the University. ERA-NET networks provide opportunities for short-term visits to external partners. Curriculum academic staff improve their skills with the support of international programs. For example, with the Erasmus + program, Professor D. Arney and lecturers M. Kass and P. Piirsalu have attended foreign higher education institutions and given lectures. P. Piirsalu attended the Norwegian University of Life Sciences in October 2019 and organised three lectures for students on small ruminants in Estonia. In December 2019, the Norwegian host professor Lars Olav Eik gave lectures on sheep and goat breeding systems to students of the Estonian University of Life Sciences. Associate Professor M. Kass has taught at the University of Kraków, the University of Jordan and the L'Ecole d'Ingénieurs de Purpan in France. Associate Professor R. Leming participated in the international grazing project "CORE Organic GrazyDaisy" in 2018–2021, D. Arney and M. Kass in the EU project "Data Driven Dairy Decisions For Farmers" (4D4F) in 2016–2019.

Academic staff of the master's curriculum in "Animal Science" participate in international collaboration projects; Professor D. Arney, Professor T. Kaart and P. Piirsalu in Horizon 2020 program Sm@RT – Small Ruminant Technology – Precision Livestock Farming and Digital Technology for Small Ruminants". The research information of the project is discussed with master's degree students in the subject "Special course in sheep and goat production". Lecturer A. Tänavots is involved in the Horizon 2020 project "Enhancing environmental sustainability of livestock farms by removing barriers for adopting ICT Technologies", which researches digital solutions on pig and poultry farms, which requires close interaction with practitioners. The European Interregional Cooperation Program INTERREG project "Advanced manure standards for sustainable nutrient management and reduced emissions" (2017–2019) developed a calculation tool, with the participation of Associate Professor A. Kaasik. This calculation tool can be used by students to solve problems in the subject "Animal production and environment".

Students' feedback on curriculum and academic staff is analysed at meetings of the curriculum committee. The feedback by the students given *via* ÕIS is displayed to the members of the academic staff related to the subject and the head of the curriculum. If necessary, the head of the curriculum or the head of the chair discusses the issues with members of academic staff whom the students have given negative feedback. Based on the feedback from students, practitioners are involved in the subjects "Special course

in dairy cattle production", "Special course in pig production" and "Special course in beef cattle production".

Teaching/studies are based on the University's good academic practice and the principles of academic ethics. The senate regulation "Cood Academic Practice and Implementation of Principles of Academic Ethics in Estonian University of Life Sciences" is followed by the academic staff. The principles of Academic Ethics and the rules of study regulation are introduced to master's students at the beginning of the academic year. Academic fraud, incl. creative theft, is dealt with in the subject "Research methodology and study design in animal science". Academic staff inform students at the beginning of the subjects about the principles of academic ethics. The procedure for academic fraud and violation of academic ethics is specified by the Study Regulations. In the event of academic fraud or suspicion thereof, the academic staff member requests a written explanation from the student and submits a written application to the director of academic affairs, with evidence for processing the case of academic fraud. The plagiarism detection program Ouriginal is available to academic staff and students.

The University values **practitioners involved in teaching/studies.** With the support of the institutional development program ASTRA project "Value Chain Bioeconomy", the chair has applied case based tasks, involving practitioners: students collect feed samples in the farm, analyse them in the feed laboratory of the chair of animal nutrition, compile dietary rations based on the results of the analysis and the feeding practice of the farm, and compare their results with the actual nutrient requirements.

Linda Pajo and Denis Pretto, practitioners involved in the master's curriculum, introduce animal production trends at the Andri-Peedo dairy goat farm and the Viinamärdi dairy sheep farm within the framework of the project "Value Chain-Based Bioeconomy".

Practitioners were also involved in teaching within the framework of the ESF measure "Linking learning to the needs of the labour market" project "Involving practitioners in teaching/studies" (2014–2020). Külli Kersten, the head of pig performance inspection of the Estonian Livestock Performance Recording Ltd, is involved in the subject "Special course in pig production". Students get an overview of how performance data on farms are managed and practice entering performance data into the data collection program Possu. Tõnu Põlluäär (alumnus), representative of the Animal Breeders' Association of Estonia, gives guest lectures in the subject "Special course in beef cattle production" and Sven Saal (alumnus), project manager of AS Dimedium, introduces herd management programs.

Academic staff members get feedback on educational activities from students mostly from the feedback in ÕIS, but feedback surveys are included in studies as well. **Evaluation** is to get an idea of the professional development of academic staff and the proportion of research and teaching/studies in their workload. For the evaluation, the staff member prepares a self-analysis with more detailed information about teaching/studies. The direct organiser of work attaches his/her assessment of the quality of teaching/studies to the report. Evaluation considers preparing/compiling/writing textbooks, e-courses and other study materials, supervision of students' theses, incl. the number of supervisions and defended theses, and the results of the feedback given by students. Academic staff are asked about the principles of teaching and his / her professional experience. As a result of evaluation, feedback and assessment of the previous period of the staff member's work and recommendations for the future are given. Membership of the evaluation committee must avoid conflict of interest between the members of the committee and the person being evaluated, taking into account joint projects, publications, joint subjects, etc.

A performance review is held once a year between the member of academic staff and the head of the chair, where, among other things, issues related to teaching/studies are discussed.

The academic staff of the curriculum regularly participate in international scientific conferences, information events and trainings. The academic staff of the chairs participate in the committees of the Estonian Rural Development Plan 2014–2020 Knowledge Transfer Program *(in Estonian*) working groups of the Estonian Ministry of Rural Affairs and the Ministry of the Environment, advisory bodies, EPKK committees, collaborating with breed societies, the Agriculture and Food Board and preparing expert opinions. The specialists of the chairs advised on the National Development Plan for Agriculture and Fisheries, PõKa 2030. In addition to research, the academic staff of the chair publish articles in popular science journals, newspapers and newsletters, and advise livestock farmers, helping them to analyse and

resolve issues arising in animal production enterprises and they advise the Ministry of Rural Affairs and Agriculture and Food Board.

Strengths, areas for improvement and planned development activities

Strengths	
• Academic staff participate in international research projects • Collaboration with practitioners who are involved in teaching/studies	
Areas for improvement	**Planned activities**
• Staff mobility increase	• Developing collaboration and communication with foreign universities with the objective of increasing staff mobility

4.3. CIVIL ENGINEERING (RURAL BUILDING)

Curriculum title, studies	Civil Engineering (Rural Building), BACHELOR'S AND MASTER'S INTEGRATED STUDIES
Structural unit responsible for the curriculum	Institute of Forestry and Rural Engineering, Chair of Rural Building and Water Management
Curriculum self-analysis preparation facilitator Head of Curriculum / program manager	Alexander Ryabchikov, PhD, Associate Professor, Head of Curriculum, alexander.ryabchikov@emu.ee, Phone: +3727313173
The process of preparing the curriculum self-analysis and report	The process of preparing the curriculum self-analysis and report started with forming the working group: Head of Chair, Associate Professor Toomas Tamm, lecturers Kaarel Sahk, Tõnis Teppand, Kadri Leiten, Renno Reitsnik, engineer Sirje Keskküla, student representatives Käbi Kreismann (3rd year), Laura Lotta Laanemets (2nd year), Triin Randmer (4th year) and representative of employers Martti Lainurm. The first meeting took place on 10.05.2021, when the tasks for preparing the self-analysis were distributed among the members of the working group, a schedule and mid-term meetings were planned. Academic staff of the chair, students on the curriculum and the quality manager of the University gave feedback on the self-analysis.

4.3.1 Planning and management of studies

Developing and implementing curricula

"Civil Engineering (Rural Building)" is an integrated bachelor's and master's study with the duration of 5 years and volume of 300 credits (ECTS) (**Appendix 19**). Civil engineering framework requirements *(in Estonian)* are established by the regulation of the Government of the Republic of Estonia. Five-year studies are supported by employers, who are members of Estonian Association of Civil Engineers and *via* the association contribute to the professional standard for civil engineers. The curriculum of "Civil Engineering (Rural Building)" is in accordance with the laws and requirements in force in the Republic of Estonia and the EU; development of the curriculum and quality assurance are guided by the objectives of the University, development plan and feedback to the curriculum from stakeholders. According to surveys by OSKA the need for new graduate engineers is great, 385 engineers a year.

Curriculum development is led by the head of the curriculum and a curriculum development committee *(in Estonian)* has been formed, incl. academic staff and students of the chair, also employers. Committee meetings are held once an academic year, more often if necessary, and minutes are kept. The committee discusses feedback and development suggestions for the curriculum, received during the academic year. Curriculum change suggestions with justifications are submitted to the Senate Committee of Academic Affairs.

During developing, the curriculum is compared with other similar curricula, in Estonian context especially with the curriculum of Tallinn University of Technology (TTÜ) "Structural Engineering and Construction Management". The academic staff of the chair of the University and of speciality subjects of TTÜ collaborate in developing the content of the basic subjects, in the course of which the content and volumes of the basic subjects of the speciality were unified in 2020 to support and promote student mobility between the universities. However, some speciality subjects of the chair are somewhat different in scope and content from the subjects in the TTÜ curriculum, as our curriculum includes construction of agricultural buildings (barns, pigsties and poultry farms, etc.). Among foreign universities, the curriculum is compared with the University of Tampere curriculum of civil engineering, also collaboration of academic staff takes place.

Curriculum studies are based on modern science and practice, supported by staff **research and development,** incl. research projects and cooperation with enterprises. Students are involved in research projects, especially for preparing their theses (**Appendix 27**), also students prepare theses on topical and required issues of applied research for enterprises. Relevance and quality of theses defended on applied research topics is shown by the recognition of defended theses with awards of professional organisations. Theses on concrete research supervised by lecturer V. Pallav were awarded in 2018 and 2019 by Estonian Concrete Association and the enterprise OÜ Donleon recognised the students.

Curriculum coherence

The aim of the "Civil Engineering (Rural Building)" curriculum (**Appendix 19**) is to prepare civil engineers for master's degree, whose thorough speciality knowledge, skills and attitudes correspond to the Diploma Civil Engineer in Buildings and Structures, (level 7 Higher Education level), who can take responsibility and make sustainable strategic decisions to foster their speciality and field. General and professional competencies are closely linked in the curriculum and developed within the subjects. Students develop creativity with design tasks, where load-bearing structures are created under the guidance of the academic staff, whereby materials, the arrangement of load-bearing elements, etc. must be chosen. In the subject "From idea to business plan" focuses on developing a business idea, and the output is the ability to defend it. Digital competencies are developed throughout subjects: "CAD-systems (3D)", "BIM-engineering and analysis of buildings", "Design of rural buildings" (**Appendix 21**) etc.) using different engineering software. Teamwork skills are developed in group work. Graduates' assessment on acquisition of general competencies is presented in **Table 28**. Fluctuating assessment may be caused by academic staff not always emphasising to students that solving the tasks also develops general competencies.

Curriculum coherence is highlighted with the sub-modules (**Appendix 19**) and the system of prerequisites (**Appendix 25**), i.e. the subjects are acquired in a certain order based on the content. Coherence is supported by communication and collaboration of academic staff. Curriculum coherence is monitored by the head of the curriculum through the feedback given to the subjects. The links between the modules and subjects of the curriculum is presented as a block diagram (**Appendix 25**). Assessment by graduates on coherence and overlap of content subjects is presented in **Table 28**. The results show that the graduate feedback varies and fluctuates from year to year, so achieving a stable upward trend is an aspect to be developed of the curriculum. The curriculum was given feedback by 2020/2021 graduates, who started their studies in 2016. Based on previous feedback from graduates, the order of subjects by term had been significantly changed in the curriculum. Therefore, the links between several subjects have changed, and the feedback results show that the change did not have a positive effect. By now, the subjects are grouped into targeted sub-modules (**Appendix 19**), however, the impact of this change will only be seen in the feedback from graduates after five years.

Table 28. Graduates feedback on acquisition of general competencies, curriculum coherence and subjects overlap for the academic years 2017/2018–2020/2021 (rated on scale of -2 to +2, where -2 disagree...+2 agree)

Graduates satisfaction rate	2017/2018	2018/2019	2019/2020	2020/2021
General and transferable skills	0.86	0.33	1.25	0.88
The subjects are in logical sequence	0.14	0.83	1.00	0.38
Substantial overlapping between the subjects is justified	0.29	1.17	0.75	0.50

Students' feedback of learning outcomes-based assessment is presented in **Table 29**. Feedback shows that assessment that is based on learning outcomes works relatively well in the curriculum.

Table 29. Student feedback on assessment based on learning outcomes for the academic years 2017/2018–2020/2021 (rated on scale of -2 to +2, where -2 disagree...+2 agree)

Students satisfaction rate	2017/2018	2018/2019	2019/2020	2020/2021
Assessment of learning outcomes	1.57	1.57	1.53	1.52

At the University level, internal curriculum evaluation was initiated (see Chapter ***Curriculum***), duplication of subjects is assessed and connections between the learning outcomes of the subjects and the assessment methods and criteria is monitored.

Practical training

Practical training is an integral part of study process in the curriculum. Consolidation of acquired knowledge takes place through practical experience, and it supports achieving the learning objectives in many subjects. Before starting practical training, students get acquainted with the practical training instruction, which contains guidelines for smooth organisation and explanations about the goals and learning outcomes of practical training. The subject "Practical training in building technology" first provides a week of training in the Tartu Vocational Education Centre, based on the contract of the Centre and the University, followed by students finding an opportunity for practice on a construction site. If the student cannot find a site for practice, the practical training supervisor will help him / her. The process of finding a practical training site fosters the student's self-management, entrepreneurship and communication skills.

Construction is regulated by legislation and is also constantly changing, so one of the goals of the practical training is to develop the student's ability to adapt to the current situation. If issues arise, the student and the supervisor from the enterprise get help from the University supervisor. To organise the practical training smoothly and fulfil its objectives, trainings and counselling have been organised for the supervisors from the enterprises under the leadership of the chair. Practical training takes place on the basis of a contract between three parties (University-company-student), which includes a form for ensuring occupational safety and feedback. Information on practical training can be found on the website *(in Estonian)*, which allows enterprise supervisors to get an overview of the process. Students provide feedback with presentations based on their practical training reports and discussions, which lead to changes in organisation of practice if necessary.

Independent work

Students' independent work is purposeful, gets feedback, and it is oriented towards achieving learning outcomes. The volume of independent work in the subjects of the curriculum and the actual volume of work of the student are in line, which is indicated by the students' feedback (**Table 30**). According to students, the volume of independent work in the syllabus and the volume of actual work are rather consistent.

Table 30. Student feedback on volume of independent work in subjects for the academic years 2017/2018–2020/2021 (rated on scale of -2 to +2, where -2 disagree...+2 agree)

Students satisfaction rate	2017/2018	2018/2019	2019/2020	2020/2021
Volume of independent work in syllabus and volume of actual work	0.14	0.14	0.17	0.21

Student mobility

The students of the "Civil Engineering (Rural Building)" curriculum are aware of the possibilities of mobility, the relevant information is provided to them by the academic staff, the international relations specialists of the Department of Academic Affairs, and Student Union. It has been somewhat difficult to find subjects in foreign universities of a similar volume in the same semester. The use of mobility opportunities has also been hampered by lack of motivation to study engineering subjects in a foreign language abroad. Domestic mobility takes place between the University and TTÜ, as the subjects in the universities curricula are with the same volume and similar learning outcomes. In the spring semester of 2021, four students of the "Civil Engineering (Rural Building)" curriculum studied computer engineering at TTÜ and three visiting students of TTÜ studied structural mechanics here. Optional and elective subjects can be taken at other Estonian universities as well as at foreign universities. Subjects completed at another higher education institution are taken into account when completing the curriculum with RPL.

The curriculum includes subjects that can be studied in English by ERASMUS students, usually together with Estonian students. As the speciality subjects of the "Civil Engineering (RuralBbuilding)" curriculum are very complex or specific and strongly depend on the prerequisite subjects, studying in English means a great extra effort for Estonian students, therefore they are not very prone to studying speciality subjects in English. Hence, specific speciality subjects are taught separately for the Estonian and English language groups, but general and speciality electives are studied together.

Material and financial resources

The chair has sufficient financial resources to ensure the sustainability of the curriculum. There is room for improvement in modernising laboratory equipment. The Director of the Institute of Forestry and Rural Engineering, as the authorised officer, has delegated the planning and use of financial resources allocated to the chairs to the heads of the chairs. The financial budget of the Chair of Rural Building and Water Management is presented in **Table 31**. Research funding accounts for about a third of the chair's budget. One of the objectives of the institute is development activities related to curricula, which means, among other things, modernising premises and laboratory equipment and digital devices and software. For this purpose, the opportunities of research projects, baseline funding of the University and resources from the Rector's Fund are used.

Table 31. Financial budget of Chair of Rural Building and Water Management 2018–2021

	2018	2019	2020	2021**
Activity support*	529160	540201	542883	557765
Research funding	261577	482187	172907	296718
Total	**790737**	**1022388**	**715790**	**854483**

**Activity support without facilities and IT component **as of 01.10.2021*

Research services for enterprises have also increased the budget. In 2020–2021, the strength and plasticity indicators of concrete panels were determined in the chair for Latvian and Estonian factories. Companies have supported the preparation of theses-based issues of interests with materials and equipment, and have funded student scholarships. The following contracts and projects will provide additional funding for 2017-2024: Bioressursside väärindamine ja tootearendus (2021–2024, collaboration with other institutes), Humiinaineid sisaldava pinnase stabiliseerimine teemulletes põlevkivituha abil (2019–2021), Kaitsealuste metsloomade terviseuuringute ja raviüksuse III etapp (2020–2021, collaboration with Institute of Veterinary Medicine and Animal Sciences), 3D-prinditavast turbakomposiidist täiselutsükliliste haljastus- ja istutusplokkide arendamine (2018–2019), Puidu füüsikaliste ja mehaaniliste omaduste katsetamise kombineeritud metoodika väljatöötamine ning tark puidu kasutamine ehituses (2017–2018, collaboration with Chair of Silviculture and Forest Ecology), Puidu polüfunktsionaalse kaitse süvaimmutustehnoloogia väljatöötamine põlevkivituha, turba humaatide ja nanosilikaadi baasil (2019–2021), Teravilja kuivatamise ja hoidmise uue meetodi arendamine (2018–2019, collaboration with AS Tatoli), research on natural building materials for near-zero-energy buildings of the Centre of Excellence ZEBE for knowledge-based construction, etc.

The academic staff of the chair have at their disposal modern desktop and laptop computers with the necessary hardware and software and modern work spaces with up to two workstations. Within the framework of the changed work organisation due to the COVID-19 pandemic, the chair supported home offices of academic staff for e-learning (Wacom digital boards, etc.). The auditoriums, incl. three computer labs with a total of 60 workstations, are equipped with modern technology and software. Current and relevant scientific and specific literature has been acquired and is available to academic staff and students. The University Library provides academic staff and students with free access to international databases (Chapter ***3.2. Resources***), *via* **EBSCO Discovery** it is possible to search for speciality related literature in all databases accessible to the University, incl. the full text of research papers in the ScienceDirect database. The University library, Wi-Fi network and the VPN applications provide access *via* Estonian Centre for Standardisation and Accreditation to materials from the staff home computers that the staff need and are able to use in the field of civil engineering. The University library database DSpace has the theses of the curriculum since 2012.

Students use computer labs for independent studies in agreement with the academic or support staff, auditoriums for class work, books, scientific literature and construction standards database. There are seated areas in the corridors and lobbies of the study building.

Academic staff support the group work format for developing social learning environment, and give more active and proactive students the opportunity to explain the topics they are studying to their fellow students. The academic staff attitude in teaching is assessed by the students as supportive and open (**Table 32**).

Table 32. Students average feedback on academic staff attitude for the academic years 2017/2018–2020/2021 (rated on scale of -2 to +2, where -2 disagree...+2 agree)

Students satisfaction rate	2017/2018	2018/2019	2019/2020	2020/2021
Supportive attitude of academic staff to learning	1.49	1.41	1.35	1.32

Principles of environmental protection and sustainable development

Digitalisation of learning materials has significantly reduced paper, copying and printing costs. Students increasingly submit their laboratory and independent work electronically. Graduation theses, incl. PhD theses, are submitted electronically since spring 2020. If necessary, the PhD theses are printed on recycled paper. Sorting waste by type and category is organised in the University. This should motivate students do the same outside the University and after graduation. The curriculum deals with the principles of environmental protection and sustainable development in the subjects "Environmentally friendly and sustainable building", "Basics of bioeconomy", "Environmental protection and management". Environmental protection is a topic in several subjects, e.g. the subject "Agricultural buildings" deals with requirements for manure and silage storage facilities, animal husbandry requirements, etc. In the field of recycling special types of waste and materials, theses *(in Estonian)* have been written: 2019 "Glass waste use as a concrete aggregate and its effect on the compressive strength of concrete", 2020. a "Concrete recycling", 2021 "Textile waste use in concrete".

Strengths, areas for improvement and planned development activities

Strengths	
• Curriculum reflects the needs of labour market; theoretical instruction is supplemented by study and speciality practice • Speciality related companies' great interest in preparing applied theses • Modern laboratories, equipment and digital tools • Good social learning environment; supportive attitude of academic staff	
Areas for improvement	**Planned activities**
• More detailed definition of curriculum development and development activities • Clearer linking of teaching/studies and assessment methods and assessment criteria to learning outcomes • Insufficient student mobility • Depreciated laboratory equipment that does not comply with EVS-EN standards	• Preparing a more detailed action plan for curriculum development, continuing to organise curriculum development seminars, involving stakeholders • Organising training and seminars for learning outcomes-based assessment for academic staff • Mapping the possibilities of motivating students to participate in mobility, incl. finding internships abroad • Finding additional resources to modernise or replace depreciated testing/experiments equipment

4.3.2. Learning, teaching and assessment

Admissions requirements and process

Curriculum admission requirements are introduced in the University website (*in Estonian*) and social media. The curriculum and speciality are advertised on television, radio and in the press, at trade fairs and educational information events Teadlaste öö, Intellektika, Orientiir, Ehitusmess. The speciality is introduced in the final grades of the upper secondary schools, and the University organises workshops introducing the specialities every year within the framework of doors-open events. In 2020 a video *(in Estonian*) to introduce the "Civil Engineering (Rural Building)" curriculum was made and is available on the University home page.

Admission is by public competition on the basis of the broad mathematics and the Estonian language state examination results, and the average score of the secondary education certificate (see Chapter ***3.8. Learning and teaching***). Candidates are advised on admission and study process issues by the University's admissions specialists, the institute's study regulation specialist and the head of the curriculum. The University offers high school graduates preparatory course *(in Estonian*) for the state exam in mathematics, the successful completion of which gives an extra point when applying to the "Civil Engineering (Rural Building)" curriculum.

In the field of civil engineering, mathematics and mathematical thinking skills are one of the most important prerequisites for successful learning, therefore the University requires the candidates who have passed the

'broad' state exam in mathematics a score of at least 20 points (max. 200 points), or those who have passed the 'narrow' state exam in mathematics, a score of 80 points (max. 200 points).

In order to get a clearer overview of the curriculum and the speciality, the chair has organised a speciality day for first-year students since 2017/2018, during which some construction sites in progress are visited. From 2020, the first week of study for first-year students is the so-called orientation week, when the University life, fellow students, tutors and successful alumni are introduced. The aim of the orientation week is to support the student in adjusting to the student's life and to provide a multifaceted overview of the profession and the curriculum. During the orientation week and the subject "Introduction to engineering studies and engineering ethics" as well as in other subjects in the first semester of the first academic year, construction sites and companies are visited. Practitioners from construction-related companies are involved in teaching/studies.

Study process

The attitude of the academic staff of the curriculum in teaching is supportive of the students (**Table 32**), the staff offer students tasks and projects of complexity corresponding to their level of knowledge and skills; the most capable students, who help their fellow students and motivate them to work harder, are appointed as working group leaders. Academic staff deal with students who progress faster or slower, if necessary individually, and outside of contact / face-to-face hours in consultations.

Both learning and learner-centred approaches are used in teaching. The subjects "Building technology", "Technology of manufacture of timber houses and structures" and "Agricultural buildings" integrate visiting into the studies the Tartu city construction objects, renovated buildings, production companies, incl. Kodumaja, Arcwood, Imavere saw mill, and agricultural enterprises, incl. Põlva Agro OÜ. Students prepare a report on the field trips and submit it individually or as group work. Role games are also used – in the subject "Building constructions and design". A member of academic staff is in the role of the client, who presents his/her conditions and requirements on the basis of which the students prepare a project during their practical training. Students can also choose a building according to their wishes and prepare a basic architectural project that meets the requirements of the local government Building Code under the guidance of academic staff. The subject "Geotechnics" (**Appendix 22**) uses group work, with academic staff distributing the tasks to groups, but the group is responsible for their division of work, the quantity and quality within the group. Academic staff receives feedback from students and gives advice if necessary. To participate in practicums, students have to independently find possible solutions to the questions and problems, then a discussion takes place. Curriculum study methods, such as solving tasks, submitting laboratory work reports, compiling study portfolios, etc., are aimed at creating connections as a result of acquiring the study material and an understanding of how the speciality works in real life. In the seminars, students receive feedback on the correctness or shortcomings of their speciality related solutions.

An overview of the teaching/study methods, assessment methods and criteria can be found in the curriculum subjects descriptions (**Appendix 20, Appendix 21, Appendix 22, Appendix 23** and **Appendix 24)**. Students' assessment on achieving learning outcomes in subjects and academic staff feedback is generally good (**Table 33**).

Table 33. Student feedback on achieving learning outcomes and feedback given by academic staff for the academic years 2017/2018–2020/2021 (rated on scale of -2 to +2, where -2 disagree...+2 agree)

Students satisfaction rate	2017/2018	2018/2019	2019/2020	2020/2021
Achievement of the learning outcomes of the subject	0.92	0.96	0.83	0.79
Feedback to support learning	1.44	1.41	1.33	1.23

Digital learning has developed rapidly in recent years. Various digital environments are used on a daily basis to conduct studies, communicate with students, reflect on homework, and defend theses and even PhD theses, incl. Moodle, Microsoft Teams, BigBlueButton. Academic staff also use Wacom One digital whiteboards, on which the text is immediately visible to students in the digital room. During the last academic year, several trainings on digital equipment have been organised in the chair. The academic staff of the chair participated in all-university trainings organised by the University educational technologist. Students have mostly been actively involved in distance learning and digital tools, and teaching skills of academic staff in digital environments can be generally assessed as good. The test functions that are automatically checked in Moodle environment still need some practice.

Topics and supervisors for theses are chosen by students no later than in the spring semester of the fourth academic year, after the subject "Scientific research and experimental studies in civil engineering" in the course of which students are directed to study speciality related literature and analyse possible topics for theses. Practical training before graduation, diploma practice in summer, is conducted according to the plan prepared by the student and academic staff. In autumn term the student presents the practical training report and plans further activities. Students and supervisors work together to prepare the theses throughout the fifth academic year. The chair supports the activities, e.g. acquires material for tests and experiments. Using laboratories and laboratory equipment is free of charge for students.

Students' assessment on supervision has improved, compared to previous years. Graduates' feedback highlights the competence and helpfulness of the supervisors (**Figure 23**).

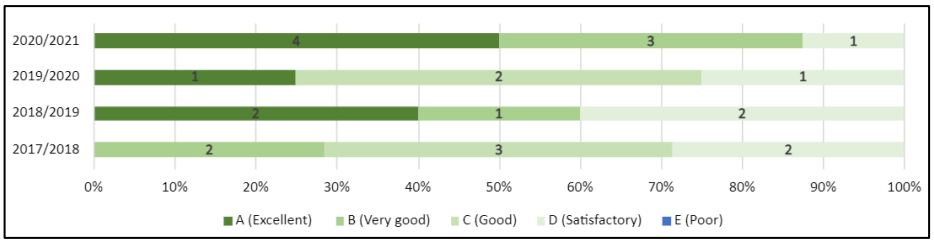

Figure 23. Graduates' assessment on supervision for the academic years 2017/2018–2020/2021.

Students assessment

Organisation of subjects, incl. teaching and assessment methods, components of a grade and the assessment criteria are described in the syllabi, the preparation of which is regulated by the Study Regulations. Syllabi of subjects are available to students in ÕIS when registration for the subjects starts. At the beginning of studies, academic staff gives an overview of syllabi, subjects, assessment methods and criteria.

A variety of assessment methods are used to assess learning outcomes: tests, presentations, reports, projects, laboratory work, study portfolios, participation in studies, pass/no-pass and graded examinations, etc., incl. formative assessment, self-reflection and peer assessment. Projects prepared during a whole term are assessed in two aspects: assessment is given as feedback during the process and to the finished project. Academic staff consult with each other about the advantages and disadvantages of assessment methods and analyse the assessment criteria. Within the framework of formative assessment that supports learning, lecturers prepare, in the subjects "Geotechnics" and "CAD-systems (2D)", a memo of common mistakes that enables students to check their work before submitting it. The academic staff of subjects concerning the load-bearing capacity of structures uses a method of checking the students' work up to the first error. The student re-submits the work until the errors are corrected. The objective of the method is to develop accuracy and ability to prevent errors relevant to an engineer.

Students' results are assessed by academic staff teaching the subjects on the basis of assessment criteria approved by the member of staff responsible for the subject. The practical training supervisor from the enterprise gives a written assessment of the student's performance, which the University takes into account in the final assessment and grade of the practice report.

Defences of theses take place with a committee. The University confers the graduates the Diploma Civil Engineer in Buildings and Structures, (level 7 Higher Education level), thus diploma civil engineers outside the University belong to the defence committee. Participation of members of the committee is confirmed by Estonian Association of Civil Engineers. Minutes on the procedure of the defence are taken, the result of the defence can be contested according to Requirements and Procedure for the Awarding of Bachelor's and Master's Degree.

The University has the procedure for recognising previous studies and work experience (RPL) (see Chapter ***3.8. Learning and teaching***). The Institute of Forestry and Rural Engineering RPL committee is formed by academic staff of various specialities, who evaluate the submitted applications, often asking for an expert opinion from the academic staff of the respective subject. If the committee has not granted the application, it is mainly because the learning outcomes of the requested subject have not been acquired to the required extent and volume during previous studies or the theory has not been acquired in the course of work experience.

Supporting students

Students are supported by a study regulation specialist who advises them from admission to graduation. The study regulation specialist prepares a study plan for each academic year, taking into account that students have to be able to participate in all subjects of the respective course in accordance with the curriculum. The structure of the study plan in the "Civil Engineering (Rural Building)" curriculum is based on the system of prerequisites. If a student has study debts, an attempt will be made to allow participation in the failed subjects by adjusting his / her study plan. In the field of civil engineering, it is customary for a course supervisor to be appointed for a first-year course until the students have graduated. Students can always approach the academic staff of the subjects, the head of the curriculum and the specialists of the Department of Academic Affairs, incl. the career specialist and the psychologist (Chapter ***3.10. Study support systems***). Orientation week and the subject "Introduction to engineering study and engineering ethics" give information to students, incl. the psychologist, career specialist and specialist in international relations. Graduates' assessment on the organisation of studies and the support provided during the studies is very good (**Table 34**).

Table 34. Graduates feedback on organisation of studies and support provided by institute during studies for the academic years 2017/2018–2020/2021 (rated on scale of -2 to +2, where -2 disagree...+2 agree)

Graduates satisfaction rate	2017/2018	2018/2019	2019/2020	2020/2021
Study organisation (examination organization, academic leave, extension of studies, study abroad, registration for subjects, etc.) facilitates learning	1.29	1.33	1.75	1.25
Necessary information about organisation of studies (examination organisation, academic leave, extension of studies, studying abroad, registration for subjects, etc.) is available on time	1.29	1.17	1.25	1.13
Study support (necessary information, good advice, consultations, help in studies, etc.)	1.67	1.33	1.50	1.43

Number of students and drop-outs

The number of students in the "Civil Engineering (Rural Building)" curriculum has remained at the same level in 2017–2021: an average of 150 students, 16% of whom are female. Curriculum admissions have also remained at the same level on average. Data on graduates and drop-outs of the "Civil Engineering (Rural Building)" curriculum are presented in **Table 35**. The percentage of graduates in the curriculum is 36–45%; 67–90% of graduates with the nominal study time (**Figure 24)**, depending on the year. The rate of completing the curriculum with nominal study time is high for five years of integrated civil engineering training. The percentage of drop-outs in the curriculum is 45–55%, of which the drop-out rate in the first term is relatively low.

Table 35. Completion of curriculum and drop-out in the curriculum of "Civil Engineering (Rural Building)"

Year of admission	Admissions	Graduates	incl. nominal period	Graduates nominal + 1 year	Drop-outs	incl. drop-outs during 1st term	1st academic year drop-outs	Graduates from admissions (%)	Drop-outs from admissions (%)
2013/2014	34	9	7	1	24	1	9	**26.5**	**70.6**
2014/2015	34	15	10	4	19		6	**44.1**	**55.9**
2015/2016	28	10	9	1	13	1	6	**35.7**	**46.4**
2016/2017	34	7	7		19	5	11		**55.9**
2017/2018	29				15	6	10		**51.7**
2018/2019	33				14	2	8		**42.4**
2019/2020	33				10	1	6		**30.3**
2020/2021	39				5	5	5		**12.8**

The most common reasons for dropping out of studies are taking up military service and not returning to the speciality, taking up employment, taking academic leaves that accumulate; taking academic leave to care for a child under the age of three until the child reaches the age of three, complicated base subjects of the speciality, disappointment in the chosen speciality. In order to reduce drop-out, information is planned

to be obtained on students who do not submit their assignments on time. The course supervisor can then identify the bottlenecks at the earliest possible stage and seek solutions with the student.

At the beginning of each academic year, an e-mail is sent to all potential external students who realistically could graduate. The proposal to continue is made on the basis of the volume of missing credits and the list of failed subjects. The Department of Academic Affairs and the study regulation specialist of the institute deal with drop-outs to decide if they could continue and graduate. The head of the curriculum and the academic staff also invite former students working in construction to return to the University and graduate. The number of external graduates in 2017–2021 is shown in **Figure 24**.

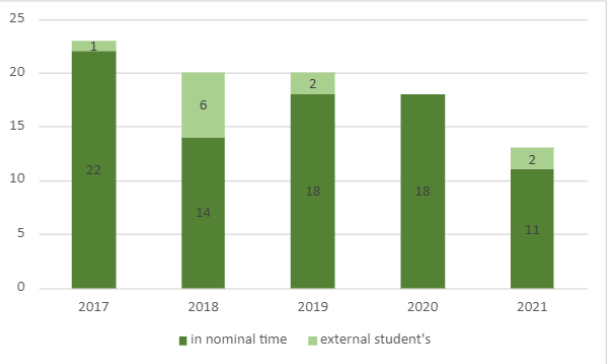

Figure 24. Number of graduates with nominal time and externs in 2017–2021.

Competitiveness of graduates in the labour market

Alumni provide feedback on the curriculum, and there were made several changes to the curriculum based on their proposals. Feedback from alumni indicates that the education acquired in the "Civil Engineering (Rural Building)" curriculum is of a high level and recognised in Estonia and abroad. Graduates from the curriculum are members of councils or management boards of large construction companies, business owners, managers or project managers – Rand ja Tuulberg Ehitus AS, Embach Ehitus OÜ, AS Tari, Vennad Ehitus OÜ, AS Ehitustrust. Several alumni have received professional recognition: Peeter Voovere is the Builder of the Year 2015, Erkki Kukka is the builder of Arvo Pärt Music House in Rakvere, Heinrich Kolnes is the builder of the roof of Helsinki Central Library (2018), Laur Lõvi is the Civil Engineer of 2020, etc.

Strengths, areas for improvement and planned development activities

Strengths	
• Curriculum development is regular and takes place in collaboration with stakeholders • Comprehensive support for students at the beginning and during their studies • Teaching methods are diverse, learning and teaching in e-environments work well • Alumni are competitive in the labour market	
Areas for improvement	**Planned activities**
• Finding motivated student candidates with good knowledge of mathematics and physics • Wider use of various Moodle features • Reducing the number of drop-outs	• Continue marketing the speciality to increase the number of candidates and, as a result, to find applicants with good prior knowledge; raise the threshold for math skills upon admission • Refer academic staff to practice Moodle learning environment • Identification of potential drop-outs as early as possible

4.3.3. Development, cooperation and internationalisation of teaching staff

Staff qualification

Based on the lecturer position PhD degree requirement of the University since 2020, the chair is working towards the lecturers holding full-time positions having a PhD degree or a professional qualification corresponding to the level. As of 01.12.2021, the percentage of curriculum academic staff with a PhD or an equivalent qualification is 31.6% (**Appendix 26**).

The "Civil Engineering (Rural Building)" curriculum is taught by 57 lecturers, 33% of whom are female. The average age of the staff is 51 years (**Figure 25**).

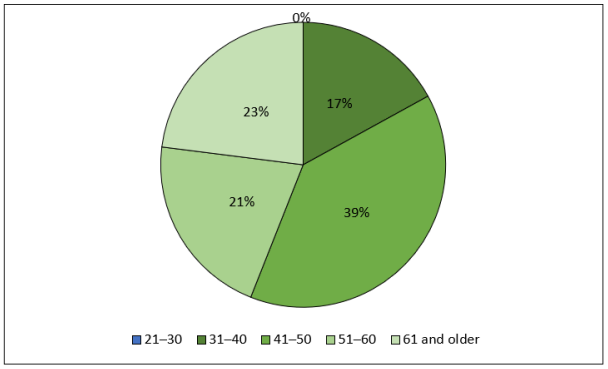

Figure 25. Age of speciality teaching staff in "Civil Engineering (Rural Building)" curriculum (*date: 01.09.2021*).

Academic staff courses and training

Teachers understand the relevance of professional development and plan regular continuing education courses and training. Most academic staff of the curriculum have at least the Diploma Civil Engineer in Buildings and Structures, level 7, which requires speciality continuing education on a regular basis. It has been agreed in the chair that each member of academic staff participates in at least one pedagogical training a year; on the other hand, participation is not limited and participation in more events only needs to be approved by the chair. In the last two years, the University educational technologist has organised various courses and training, incl. on the use of digital environments (Moodle, BigBlueButton, Microsoft Teams) in studies, which has significantly supported the development of staff in the use of digital tools and e-learning. The University has also organised several pedagogical training series "From teacher to teacher", one part of which is sharing the experience of academic staff with various teaching methods. The academic staff actively apply the acquired knowledge in the study process and share it with colleagues in the chair, for example by organising peer seminars on supervising styles and good research practices. Leadership skills training events are also planned for the next academic years.

Training plans for academic staff are made by the member of academic staff and the head of the chair together, according to the wishes of the member of academic staff and the training needs revealed during the performance review. Academic staff has the right to use a term free of study, the sabbatical leave, once every five years. Sabbatical leave has been used for professional development as well as for research to defend a PhD degree. A staff member's business trip to the laboratory of the Higher Education Institution Specialising in Wood Sciences and Technologies in France involved a student who used the data obtained for the master's thesis. The chair analyses effectiveness of business trips on the basis of student feedback. Two members of academic staff of the chair attended the Catholic University of Leuven in Belgium in the autumn term of 2021 to establish collaboration in the field of building physics, four members of academic staff participated in the Rothoblaas 5th Mass Timber seminar in Italy.

The beginning members of staff are supported by heads of the chair and curriculum. Head of chair provides IT and teaching aids/tools and introduces the rights and obligations corresponding to the position. Head of curriculum introduces the documents and digital systems regulating the study organisation of the University (ÕIS, WebDesktop, Moodle, BigBlueButton, etc.). Colleagues are involved in the process, explaining the content, structure and syllabi of the subjects. Courses and training in teaching methods and assessment skills is recommended for the beginning member of academic staff. Academic staff is encouraged and assisted to keep the motivation high.

Students' assessment on teaching skills and explanations of organisation of studies in the subject are positive (**Table 36**).

Table 36. Student feedback result for teaching for the academic years 2017/2018–2020/2021 (rated on scale of -2 to +2, where -2 disagree...+2 agree)

Students satisfaction rate	2017/2018	2018/2019	2019/2020	2020/2021
Mastery of teaching	1.35	1.28	1.19	1.26
Clarity of organisation of studies (learning outcomes, requirements, assessment criteria etc.)	1.45	1.46	1.43	1.37

Teaching/studies are based on the University's good academic practice and the principles of academic ethics. Students are introduced to aspects of **academic ethics** and ethics of civil engineering at the beginning of the first academic year in the subject "Introduction to the engineering study and engineering ethics". The attitude of academic staff towards academic fraud is negative. Several members of academic staff of civil engineering are practitioners in their field, whose experience makes it possible to detect fraud, such as falsification of data, and react immediately to it. As professional engineers, academic staff adhere to not only academic ethics, but also the requirements of engineering ethics. Academic staff has good knowledge of construction literature/publications, which enables them to understand whether the content is authentic and correctly referenced or plagiarism by identifying the Estonian translation of foreign language sources. Academic staff also rely on the principles of research ethics signed by Estonian research institutions.

Prevention of academic fraud begins with developing ethical attitudes in the first academic year of civil engineering and lasts until the end of the studies, when the canonical compliance with the Student written work requirements can be seen in the student's thesis. Good research practice, plagiarism and referencing to sources is explained by supervisors, as well as in the subject "Scientific research and experimental studies in civil engineering". Before submitting the thesis, it is checked with the OURIGINAL plagiarism detection program. So far, there have been no cases of plagiarism in the final theses of the curriculum.

Mobility of academic staff

One of the goals of international mobility of academic staff is to be aware of the content of similar curricula at other universities and to share experiences in teaching and curriculum development. The lecturers of the "Civil Engineering (Rural Building)" curriculum have long-term professional contacts with the lecturers of the civil engineering curricula of Latvian and Lithuanian universities, with whom conferences and seminars are organized to share research results. International mobility of academic staff is mainly related to participation in research conferences and workshops and the presentation of research results. Conferences provide an overview of recent research results elsewhere in the same field and establish contacts for developing teaching/studies and research collaboration. To improve the quality of teaching, R. Reitsnik and T. Teppand participated in the *Vertex* software training in Finland and T. Teppand participated in the "BUP Teachers Course 2018–2019 Education for Sustainable Development in Higher Education" at the University of Jagiellonia in Poland. Associate Professor A. Ryabchikov participated as a visiting lecturer in the autumn semester of 2019 in teaching the subject "Advanced structural mechanics" at the Latvia University of Life Sciences and Technologies.

In 2017, the international evaluation committee of the curriculum group recommended more foreign lecturers in teaching the "Civil Engineering (Rural Building)" curriculum. *Via* the PhD school of construction and environmental engineering, several foreign lecturers have taught in the curriculum in 2017–2020). Mobility has been somewhat hampered by the COVID-19 pandemic of recent years, but several online lectures by foreign academic staff are planned as a solution.

Collaboration with practitioners

Study process of the "Civil Engineering (Rural Building)" curriculum involves close cooperation with practitioners in the field of construction. Companies offer practical training opportunities to students and support work for graduation theses, and experts in the field participate in defence committees. There are several subjects in the curriculum that are taught in collaboration with practitioners: "Construction materials" has had good collaboration with Mira Ehitusmaterjalid OÜ in the last five years, the subject "Renovation of buildings" is attended by an advisor from the National Heritage Board; academic staff member responsible for the subject "Steel Structures" is a Level 8 Authorized Engineer in Design and Project Management. Practical training opportunities are found in close collaboration with alumni.

Assessment of academic staff

Academic staff receive feedback from several sources: students who have participated in the subject, academic staff of other subjects, incl. prerequisite subjects, the direct organiser of work, incl. performance reviews, evaluation committees according to tenure path evaluation.

Workload of academic staff depends on the position, e.g. the teaching workload is the largest part of the lecturer's workload and the research part is the smaller part; however, in the position of a professor the

proportion is reversed. The workload of the staff of the chair is based on the principle that while the workload of a research project implementation is higher, teaching/studies workload is somewhat lower. A free term, sabbatical leave, is granted for professional development, research, and writing a PhD thesis. Academic staff are recognized at both the University and chair level, staff are rewarded for successful work and a bonus is paid for additional work and tasks performed.

The University has set the goal that at least one ETIS category 1.1 article is published per academic staff member per academic year. The number of articles by the academic staff of the Chair of Rural Building and Water Management has been relatively small so far, therefore the chair sees the need to support academic staff members in participating in scientific conferences which publish the materials in special publications of scientific journals and in ETIS category 1.1.

Service to society

Academic staff of the Chair of Rural Building and Water Management belong to the professional unions Royal Institution of Charted Surveyors, Estonian Association of Civil Engineers, Estonian Woodhouse Association, Estonian National Committee for Mechanics; and as representatives and spokespersons to the Estonian Digital Construction Cluster. Academic staff participate in the construction and education fairs Intellektika and Orientiir, appear in national broadcasting programs, e.g. "Curiosity Centre of Excellence", where wooden structures were introduced in the laboratory of timber structures, and as reviewers in the national competition for student research by Estonian Research Council ETAG. Academic staff of the chair participate in providing research services aimed at society through the collaboration ADAPTER network of research and development institutions.

Strengths, areas for improvement and planned development activities

Strengths	
• Chair supports participation of academic staff in courses and training, the content is shared with colleagues and applied in educational activities • Close cooperation with practitioners in the field • Distribution of teaching/studies workload is flexible and the volume of research is taken into account • Academic staff are involved in professional networks and cooperate with professional associations	
Areas for improvement	**Planned activities**
• Staff succession • Foreign academic staff and practitioners involved more in teaching/studies • Publications of 1.1 category	• Foster efficiency of sectoral PhD studies, thereby increase the succession of academic staff and bring motivated young people to teaching/studies and research • Inclusion of wooden buildings module in the curriculum requires thematic lectures of local and foreign specialists • Supporting participation of lecturers in scientific conferences, the published articles of which correspond to category 1.1

4.4. Veterinary Medicine and Food Science

Curriculum title, studies	Veterinary Medicine and Food Science, PhD
Structural unit responsible for the curriculum	Estonian University of Life Sciences Institute of Veterinary Medicine and Animal Sciences
Curriculum self-analysis preparation facilitator, Head of Curriculum / program manager	Andres Valdmann, professor, andres.valdmann@emu.ee, +372 55599081
The process of preparing the curriculum self-analysis and report	The process of preparing the curriculum self-analysis and report started with forming the working group, who met 04.04.2021. The principles and purpose of the self-assessment were defined and tasks were divided. 11.05.2021 EKKA organised a self-analysis preparing process training. The self-analysis report was prepared in the period May – September 2021. At the meeting of the working group on 21.09.2021, the content of the report and the issues that arose were discussed. Improvements and amendments to the report were the next step. Review and discussions of the report continued in October. The process of self-analysis was led by Head of Curriculum, Professor Andres Valdmann. The self-analysis team included Professor Arvo Viltrop, Professor Mati Roasto, Professor Toomas Orro, Associate Professor Ivi Jõudu, Assistant Professor Helena Andreson, Senior Lecturer Andres Aland, chief specialist of the doctoral school Diana Pungar and chief specialist Külli Kõrgesaar.

4.4.1. Planning and management of studies

Developing and implementing curricula

In developing PhD studies and ensuring compliance with the requirements for PhD theses and quality, the University proceeds from the PhD study quality agreement *(in Estonian)* signed by the Rector's Council of Estonian universities 15.01.2020. "Veterinary Medicine and Food Science" (VMTD) PhD curriculum and requirements have been updated, considering sectoral differences and encouraging PhD students to publish in high impact scientific journals and publications instead of focusing on volume related targets. The quality and impact of PhD theses have significantly improved in recent years. Comparing the VMTD curriculum PhD theses defended in 2016–2018 with the PhD theses defended in 2020–2021, it can be concluded that the average number of WOS articles per PhD thesis has increased (2 *vs.* 3.14), the same trend is in the number of articles published in Q1 journals (0.33 *vs.* 1.86) and the number of articles published in Q2 journals (0.67 *vs.* 1.43). The University has developed PhD studies to support the career of specialists with PhD degrees in the public and private sectors, where 46% of PhD students who graduated in 2016–2021, are employed full-time or part-time.

Curriculum development is an ongoing process under the responsibility of the VMTD curriculum committee, whose meetings are held as required, but at least once a year. In 2019/2020 six video meetings took place. Curriculum development committee considers national and international practices and trends, the recommendations by the accreditation committee of PhD studies (2018), the results of the PhD student satisfaction survey (2019) and the decisions adopted at the University PhD studies development seminar (2018). The curriculum was last changed in February 2017 and May 2020. The share of PhD thesis has increased (previously 180 *vs.* 200 ECTS), the emphasis in the curriculum is on flexibility, allowing the PhD student to choose subjects/courses that support the development of the PhD student, the module "Entrepreneurship" has been added. Changes in the curriculum were applied for the 2020/2021 admissions (**Appendix 28**). The previous VMTD PhD curriculum for PhD students who started their studies before 2020 required completing subjects for at least 60 ECTS, of which the general module subjects formed 20 ECTS and the speciality subjects 40 ECTS. Feedback from the PhD students indicated that the volume of compulsory subjects is not reasonable. PhD students needed more freedom in the choice of speciality subjects, which is taken into account from 2020/2021. The choice of speciality subjects is now based on the PhD student's individual plan and the objectives of the PhD thesis. Speciality related courses in Estonia and abroad, courses in academic expression skills, presentations at conferences and speciality related courses and subjects supporting the completion of the PhD thesis can be recognised as speciality subjects. The satisfaction survey showed that PhD students are keenly aware of the issues of intellectual property protection and copyright, therefore the subject "Research ethics" (**Appendix 32**), which deals with the main areas, guidelines and codes of research ethics, incl. ethical aspects of good research practice, issues related to authorship and the role of the researcher in the scientific community and society, was included in the curriculum in 2020/2021. The subject "Philosophy of science" was no longer considered necessary in the current form by PhD students nor the curriculum committee. Based on the study, another fundamental change was made in the VMTD curriculum, which gives PhD students the opportunity to choose between academic and industrial fields (**Appendix 28** and **Appendix 34**). PhD students who choose the academic field must pass the module "Higher education didactics". The aim of the compulsory module "Entrepreneurship" is to support the development of PhD students in the field of entrepreneurship and innovation and to prepare PhD students for entrepreneurship, commercialisation of their research, incl. designing a business model and business plan, testing the idea and finding financial sources for it. As a result of the satisfaction survey, the study of mathematical statistics was improved: PhD students can choose between two different levels of subjects: "Mathematical statistics 1. Classical methods" and "Mathematical statistics 2. Models and patterns".

The satisfaction of PhD students with the curriculum on a 5-point scale was 4.5 in 2020/2021. The average in the last three academic years has been > 4.

Curriculum committee has compared the VMTD curriculum with the PhD curricula of neighbouring universities – Latvia University of Life Sciences and Technologies, Swedish University of Agricultural Sciences and the University of Helsinki PhD curriculum of Veterinary Medicine and Food Science. At the request of Latvia University of Life Sciences and Technologies, the expert from the Institute worked out suggestions for improvement of the PhD curricula/study program on the basis of comparative data. The

results of the comparison of the universities curricula have been used to develop the VMTD PhD curriculum.

VMTD curriculum supports the development of knowledge-based society. The curriculum follows and develops EU strategies that integrate human, animal and environmental health, such as *One Health* and *From Farm to Fork*, and takes into account the principles of environmental protection, valorisation of by-products, and the bioeconomy and circular economy. Such concepts support research that focuses e.g. on the effects of fertilizers from fish waste processing on vegetables, or the valorisation of sea buckthorn by-products as a fodder additive.

Participation in research and development projects

PhD studies are based on research and development activities, relying on implementation of research and development projects and publication of results. The prerequisite for supervising PhD theses is a research project that ensures the funding of PhD theses. PhD students belong to the working group of each major research project. The total annual financial volume of the Institute of Veterinary Medicine and Animal Sciences research projects and applied research is about 3 million euros. References to research projects are provided in PhD thesis related articles and acknowledgments.

International mobility of PhD students

Student mobility is supported by Education and Youth Board programs Dora+, Kristjan Jaak, Erasmus+. In addition, several research and development projects and grants support mobility. The PhD curriculum requires all PhD students to give oral or poster presentation at international conferences on their research topic and participate in international courses, which motivates PhD student mobility. In the last two years, physical mobility has decreased due to the Covid-19 pandemic; virtual mobility, however, has increased. The annual conference SVEPM 2021 was attended by 10 doctoral students with supervisors instead of the usual five. To carry out research, PhD students visit foreign universities and research institutions, where they conduct laboratory and field research, analyse the collected samples and the obtained results, make presentations and write articles. In the last five years, about 70% of the category 1.1. articles had co-authors from abroad and 38% of the defended PhD theses had co-supervisors from abroad.

Foreign students participate in the curriculum on the same basis as local PhD students. In 2021, nine full-time foreign PhD students studied in the VMTD curriculum. Establishing the ERA Chair of Food and By-Product Valorisation Technologies VALORTECH (project period 01.07.2018–30.06.2023) and COMBIVET, the ERA Chair of Comparative Medicine (project period 01.09.2019–01.09.2024) has enabled to increase the number of foreign and postdoctoral students at the University. In 2018–2021, 12 foreign guest students studied at the Institute of Veterinary Medicine and Animal Sciences, 38 (foreign guest) students have taken part in various VALORTECH courses.

Foreign visiting lecturers and partners

The University involves foreign partners and academic staff, who are chosen according to alignment with the curriculum, professional competence, extra competence to the curriculum, and interdisciplinarity in teaching and supervising PhD students. Collaboration with foreign partners comprises organising joint supervision, intensive courses, courses, summer schools, collaboration meetings, and lectures with the objective of increasing interdisciplinarity, improving the quality of PhD theses and publications, and increasing the international visibility of PhD studies. It has become a good practice to invite a thesis opponent from abroad, who mostly gives a speciality lecture, good examples of which are the presentations by professor Anthony Paterson ja professor Bernd Lepenies. Of the 13 PhD theses defended in the last five years, five have had seven co-supervisors from abroad.

Collaboration with alumni works very well, as the majority of PhD students continue their work at university, where they are involved in teaching, supervising and evaluating PhD students, and in PhD theses defence committees. Several graduates work as practitioners and academic staff members, being excellent supervisors of PhD theses in the field of clinical veterinary medicine.

Resources

The University has sufficient resources at its disposal to teach the subjects in the VMTD curriculum, to establish favourable learning environment and for the scientific literature/publications. In implementing

the curriculum, the institute follows the general views and operating principles set out in the University development plan. Without research projects and adequate funding, it is impossible to open a PhD study place.

Participation of PhD students in conferences and professional development in other universities and research institutions is supported through doctoral schools, the Education and Youth Board's mobility grants and other funds, the availability of these funds is sufficient. In addition, funds of research projects where PhD students participate are used for this purpose. As a rule, the financing of PhD research is from the supervisor's research projects, which is why there are no obstacles to completing the PhD curriculum in this respect either. Funding is still insufficient for PhD students to work in foreign research institutions for a longer period of time. As a rule, the funding does not allow the PhD student to take the family abroad, which is a significant obstacle to young people living abroad for a longer period of time. Funding for PhD students to manage their daily life has also been insufficient. The current scholarships are too low and PhD students can not fully commit to PhD studies. If the supervisor's projects are not funded enough to pay an additional scholarship or salary, the PhD student must work part-time to ensure an adequate income. In this case, progress in PhD studies suffers and completion of studies within nominal time becomes problematic. The University aims at enabling PhD students to devote as much as possible to their PhD work and studies, without burdening them with excessive side tasks and work. The income problem has been recognised at the state level and since 2022/2023 the position of a junior research fellow at the University is guaranteed to all beginning PhD students who wish to have the position. From 1.01.2022, the minimum monthly salary of a full-time junior research fellow is 1,400 euros, which is comparable to the national average monthly salary.

Increasing the efficiency of the use of material resources is hindered by the public procurement system in Estonia, which prevents purchasing in the most cost-effective way and increases the University costs due to the unreasonably high administrative burden. To improve the situation, the University can only try to influence the legislative bodies to change the system.

In the field of veterinary medicine, the University has a contemporary laboratory base, which includes laboratories for microbiology, embryology, endocrinology, genomics etc. PhD students use the laboratories and databases of the Agriculture and Food Board and the Estonian Livestock Performance Recording Ltd next to the campus. Clinical PhD studies are supported by the University animal clinic and the University Märja Dairy Research Farm. In the field of food science, the Chair of Food Science and Food Technology has a state-of-the-art food science and food technology laboratory complex for teaching, research and development. The sanitary unit, technology laboratories, research laboratory and classroom were completed in 2017 (cost *ca* 800,000 euros) and microbiology laboratories in 2019 (cost *ca* 300,000 euros) with the support of the ASTRA development program. Renovation of the study complex with renovated chemistry laboratories, auditoriums, offices for academic staff and general premises is in progress and expected to be completed in 2022/2023. Students can use the laboratories in Polli Horticultural Research Centre, also in other universities and research institutions (TÜ, TTÜ, BioCC OÜ, TFTAK).

The University library provides unlimited access to databases, the most relevant being CAB Direct, EBSCO databases, ScienceDirect, Scopus, Taylor & Francis, Web of Science, Wiley Online Library, and periodicals not referenced in databases. Another option is Interlibrary Loan. Books purchased in the structural units of the University are catalogued in the library and made available in the e-catalogue ESTER.

A workplace with a computer is available for PhD students at the chairs; rooms for leisure are available in all study buildings. Participation in the subjects of the general module of the PhD curriculum facilitates all-university communication of PhD students. Research related communication is facilitated by annual PhD student presentation conferences, various workshops and seminars. The study buildings are equipped with modern solutions for people with reduced mobility to access study rooms and laboratories.

Strengths, areas for improvement and planned development activities

Strengths	
• Curriculum is flexible, modern and meets the needs of society and the quality requirements agreed upon in society • Stakeholders are involved in curriculum development. Doctoral students' satisfaction with the curriculum is high • International integration (ERA chairs, opponents and co-supervisors from abroad, open international competition for PhD places) • Modern laboratory base • Graduates are competitive in the labour market • Supervisor competitions ensure funding and quality of PhD students' research	
Areas for improvement	**Planned activities**
• Income and social guarantees for PhD students • Attractiveness of PhD studies among local university graduates	• Reforming public financing system • Funding to reward PhD students to increase the number of nominal time graduates • Attracting master students to continue their research in PhD studies • Activities aimed at society to explain the value of PhD students to the private sector and public authorities to foster development

4.4.2. Learning, teaching and assessment

Admissions requirements and process

Marketing the curricula is organised by the marketing and communication department of the University. Curricula are introduced at education fairs, and in 2021 on web portals Study Portals/Masters, Educations.com, Keystone, Studimed.de. Social media networks Facebook and Instagram are used. Admission of students, incl. PhD students, at the University is regulated by the Senate Regulation. General information about PhD studies and key points, incl. the requirements for applying for PhD studies, are available on the University website in Estonian and English.

Topics of theses, contacts of supervisors and admission requirements are published on the University website. Before submitting an application for PhD studies, it is recommended to find a prospective supervisor. Doctoral school organises PhD students' admission, counsels PhD students and their supervisors. Foreign applicants can apply via DreamApply on equal conditions with local students. Candidates who have completed higher education in Estonia apply through the SAIS portal. The application form is designed to enable assessment of the candidate's ability in the desired field of study. The pre-condition for the commencement of PhD study is a master's level degree or a qualification equal thereto. Candidates must submit a motivation letter and a dissertation draft plan and a certificate on proficiency in English. The University sends foreign diplomas and transcript of records to the Estonian ENIC/NARIC centre for conformity assessment of qualifications. On the basis of the candidates' applications, the supervisors give their assessment and make a pre-selection, considering the compliance of the candidates' previous studies with the selected PhD curriculum, the prerequisites for realisation of the research topic, incl. existing publications. Candidates for PhD studies from outside the University will be interviewed. In the field of food science and food technology, a three-member committee assesses the candidate's professional competence, motivation to study and vision to conduct research. Supervisors inform the PhD studies admissions commission about their preferences. The decision on admission of a candidate is made by the institute's PhD studies admissions commission no later than the date specified in the admission schedule. Candidates are informed about the decision *via* SAIS and DreamApply.

Number of PhD students admitted to VMTD curriculum has increased 1.8 times in recent years. In 2016–2018, 10 PhD students were admitted to the curriculum, in 2019–2021, 18 PhD students.

From 2022/2023 students of bachelor's and master's studies in integrated studies in veterinary medicine complete their studies with a final thesis (previously final exams were allowed), which creates a good basis for continuing PhD studies. International interest in the VMTD curriculum is indicated: no foreign PhD students in 2017, in 2021 there were nine. The PhD thesis makes up 83% of the volume of the curriculum (200/240 ECTS), and the choice of topic is of key importance, with the main emphasis on solving issues that are necessary and future-oriented for society. Good examples are African swine fever, microbial antibiotic resistance, cow health, udder health, by-product valorisation, food safety (molecular

epidemiology and control of food pathogens in Estonian food production and consumption chain) and food product development (exploring possibilities new raw materials, using plant additives in meat products). Focus is on attractive and forward-looking interdisciplinary topics.

Learner-centred and learning-centred approach in PhD studies

The PhD student chooses a topic that offers professional speciality-related challenge, meets his / her research interests and motivates him/her. **Individual plan** is compiled for experimental work and speciality studies by the supervisor and the PhD student together. The individual plan takes into account the PhD student's abilities and previous studies; the choice of speciality subjects depends on the specifics of the PhD thesis topic. Also, specific topics and areas in which the PhD student needs additional courses and training are identified, as well as international courses, conferences and acquisition of applied research methodologies in foreign research institutions. The PhD student chooses suitable subjects from the general and specialty modules of the curriculum and the course in mathematical statistics corresponding to the specifics of the PhD thesis. The PhD student chooses the sub-module of Didactics or Entrepreneurship based on the PhD thesis or further career choice. Based on the needs and interests of the PhD student, optional subjects from the University or other higher education institutions are chosen.

All PhD students are involved as researchers or sometimes principal investigators in the activities of research projects. In the course of research, the PhD student's readiness to participate in research is assessed, and professional and psychological support is provided if necessary. PhD students can participate in article writing camps and speciality related courses. Since 2019, there have been six writing camps. The main work on the draft of an article is done by the PhD student, but in collaboration with the supervisor. The workload of PhD students is regulated by the Study Regulations. Questions that need further clarification are identified through evaluation and feedback surveys of PhD students. Systematic ongoing work with international scientific literature enables to get knowledge on the speciality field of the PhD thesis and research methodologies, and promotes generation of new ideas. Doctoral students successfully participate in competitions introducing their research, incl. the Estonian Academy of Sciences competition "Science in 3 Minutes".

Learner centred methods are applied, such as brainstorming, group work, case studies, preparation of a research project for the purpose of learning, and peer review of project proposals and article manuscripts. Due to the COVID-19 pandemic, several activities and studies are web-based. Studies take the form of webinars and digital courses are increasingly being offered, enabling flexible learning.

General competencies are supported and developed by general and speciality subjects. In addition, PhD schools offer various courses to develop general competencies, e.g. writing camps. As PhD studies are carried out according to individual plans, it is ensured that the curriculum provides sufficient challenge for students with different needs, knowledge and skills. An overview of the teaching methods, assessment methods and criteria can be found in the subjects descriptions (**Appendix 29, Appendix 30, Appendix 31, Appendix 32** and **Appendix 33**)

PhD students choose between the subjects "Didactics in higher education" and "Entrepreneurship" in the general module. 2 ECTS for practical training are provided in both subjects. **Didactics** gives the PhD student teaching experience in higher education, which is a prerequisite for choosing an academic career. **Entrepreneurship** gives experience for applying knowledge outside the university.

PhD students have the possibility to use the RPL, **recognition prior learning and work experience** (VÕTA) system to transfer their continuing education, previously completed subjects and work experience. RPL applications are assessed by the RPL committee, which compares the conformity of the learning outcomes of the subjects and approves the application with the member of academic staff of the respective subject. With work experience, a detailed description and proof of the competencies and links to learning outcomes must be provided. On a couple of occasions, the RPL committee has decided not to recognise previous studies, as it has not been possible to assess the correspondence between the completed courses and the subjects of the PhD curriculum. The number of doctoral students' RPL applications has increased from nine applications in 2017/2018 to 23 in 2020/2021.

Feedback is organised by the University Department of Academic Affairs and the supervisor of the PhD student. In most cases, feedback is provided orally and in writing throughout the studies. A common supervision feedback system needs to be developed.

PhD students receive feedback at the annual evaluation. Often, feedback interviews are needs-based, e.g. to provide guidance in the experimental part of a study or during the preparation of a research article manuscript.

Assessments, including evaluation of PhD students

In the process of developing the PhD curriculum, it is monitored and ensured that the modules of the curriculum support the achievement of the learning outcomes and objectives of the curriculum. Acquiring learning outcomes of the subjects of the general module is assessed using the assessment methods described for the subjects. Speciality subjects are selected according to the PhD student's individual plan and are based on the evaluation criteria of the selected subjects.

Learning outcomes are assessed after each subject or course. **Assessment methods** are subject or course specific. Subject **assessment criteria** are specified in course syllabi in ÕIS. Academic staff member responsible for the subject introduces the tasks that must be completed in order to complete the subject, as well as the assessment criteria. Assessment criteria for courses outside the University are presented in the course program accordingly. The PhD thesis is evaluated by the defence committee and the opponent. The defence committee consists of two non-university members and additional members according to the specifics of the speciality. Opponents are always from outside Estonia. They must not have a direct scientific connection with the PhD student's dissertation or joint publications with the PhD student or his/her supervisor.

Once a year, the PhD student's progress is **evaluated** by the evaluation committee. Evaluation is based on an individual plan approved by the supervisor and approved by the council of the institute, which sets out in detail the objectives and the stages required to achieve them, incl. the courses to be taken and the areas that need extra work, and which are the basis for choosing speciality subjects. For evaluation, the PhD student submits a report approved by the supervisors. Evaluation takes place on the basis of the PhD student's individual plan, evaluation report and slide presentation. If deviations from the individual plan have occurred during the studies, the PhD student must justify this. After reviewing the documents and hearing the PhD student, a decision on evaluation is made as a result of the internal discussion of the committee. Evaluation enables to identify and draw attention to problems in the PhD student's progress in a timely manner, to provide general guidelines for making changes, to make suggestions for improvement, to encourage and motivate, to set deadlines for additional evaluation, publication and thesis preparation and follow-up the compliance with the individual plan. Minutes of evaluation meetings are drawn up.

In addition to the evaluation in the form of a seminar, PhD students presentation conferences are organised once a year with the aim of practicing presentation skills, introducing PhD students' research topics and motivating PhD students.

Supporting PhD students

The University has central support services system to support and help students. The special needs of students may be confidential, in which case they will be treated accordingly. Students are informed about which specialist they can turn to for help. The University has a career counsellor and two psychologists. Advice on studies can be sought from the University doctoral school specialist, the institute study organisation specialist and the director of academic affairs. In the case of special needs (such as hearing or visual impairment), students can turn to academic staff, so that they are aware of special needs in their studies.

Drop-out

The number of drop-outs in the doctoral study program is characterised by volatility, ranging from one (3%) to five (12.5%) drop-outs per year. There is no clear trend of interruptions over the years. The main reason for dropping out (76%) is meeting the end of the study period before the PhD thesis is defended. Other reasons are voluntary leaving (19%) and academic progress (5%). Working during PhD studies is the biggest obstacle to graduating within nominal time. In this case, it is possible to defend the PhD thesis as an extern, which has been used by most ex-matriculated PhD students. To increase the number of graduates within nominal time, the requirements for admission to defence have been analysed. As a result, the proportion of general subjects has been reduced and the publication requirements have been eased). Co-supervisors are increasingly used to supervise PhD students. It is possible to study part-time, i.e. eight

nominal years. The evaluation committee of PhD students has made proposals for involving a co-supervisor and for transferring the student to part-time studies. If the funds are available, the supervisor can recruit a PhD student for the position of a junior research fellow or pay an additional salary. Since 2021, the state provides financial support for PhD students to be employed as junior research fellows.

Competitiveness of graduates

Graduates of PhD studies are asked for personal feedback on the quality, volume and organisation of studies. As a result of the feedback, the PhD curriculum has been amended accordingly. In 2016–2021, 13 PhD students of the VMTD curriculum have defended their PhD theses. 10 of them worked before defending their theses and still work in academic positions at the Institute of Veterinary Medicine and Animal Sciences. One of the persons having defended the PhD has passed away, one is engaged in private practice providing livestock health services in Finland and one works in the Estonian Veterinary and Food Laboratory.

Strengths, areas for improvement and planned development activities

Strengths	
• Positive and supportive atmosphere at the University • Equal opportunities in the admission of domestic and foreign PhD students • Learner centred, flexible and individual approach • Opponents are world-renowned scientists • International PhD studies environment • Good availability of support services • Graduates are competitive	
Areas for improvement	**Planned activities**
• Defence of PhD theses within nominal time and drop-out • Supervisor feedback system	• Providing adequate and motivating income for PhD students • Development of a supervisor feedback system • Involvement of co-supervisors competent in interdisciplinary areas

4.4.3. Development, cooperation and internationalisation of academic staff

PhD curriculum is taught by a sufficient number of professionally competent academic staff

The goals and activities of the University human resource management are set out in the University development plan. Only academic staff with a PhD degree (**Appendix 35**) teach in the PhD study program. The qualification of academic staff is assessed through regular **evaluation**. Regular **performance reviews are conducted,** during which the identified bottlenecks can be eliminated together with the direct organiser of work. Competitions for PhD students' supervisors are held every year, and supervisors with the best indicators and sufficient research funding are selected. The selection of supervisors is based on the requirements for supervisors established at the University. The need for PhD specialists in strategic areas for society and the University is taken into account.

The University enables professional development through Open University and ASTRA and Erasmus+ programs, incl. opportunities for the academic staff and supervisors to develop teaching, supervising and digital competencies. Support by the University educational technologist and the training offered by him are available. An academic employee without previous supervision experience begins to supervise a PhD thesis as a co-supervisor. The major concern with the succession of supervisors is the heavy workload of young teachers who have just defended their doctoral degrees, because they mostly work as lecturers at the bachelor's and master's level. The high workload does not allow them to devote enough time to research and achieve high publication numbers, which is an important prerequisite for obtaining research grants and supervision of doctoral students.

Doctoral curriculum is taught by 49 members of **academic staff** with a PhD degree. Of these, 34 work full-time and 15 part-time. In addition, several members of academic staff and supervisors from other universities teach in the VMTD curriculum. In the institute, ERA chair VALORTECH and COMBIVET and internationally recognised interdisciplinary research groups have been established, where project-based

and state-funded PhD students from Estonia and abroad can be included. In 2021, 10 VMTD doctoral students were involved in these research groups.

Development of academic staff, courses and training

According to the career regulation, academic staff is obliged to continuously develop their professional and pedagogical skills. The training needs of VMTD academic staff are identified during the annual performance review and evaluation. The University Personnel Department offers training that complements teaching and supervision skills and develops digital competencies. Due to the restrictions of Covid-19, digital competences became very important as digital solutions are used in meetings, studies, and PhD theses defences. The last five PhD defences in VMTD curriculum took place online and are available for playback later. As the number of international students increases, knowledge of different cultures and practices is becoming increasingly important. Several trainings have been organised in this area. Academic staff improve their professional knowledge by actively participating in speciality related conferences. Web-based conferences are cheaper or free of charge, which has led to a significant increase in the number of staff members attending such conferences.

The University supports academic staff mobility and has set a goal that >90% of academic staff should visit a foreign university at least once every five years. This goal has been met. Employees in full-time academic positions have the right to have a semester free of study (sabbatical leave), which is used for improving professional skills, research and development or creative work. Employees have the opportunity to apply for funds for professional development from the ASTRA development program project "Value Chain Bioeconomy". Several lecturers have moved to foreign universities for short-term study and teaching visits with the programs Erasmus+, COMBIVET, EEA/Norway Grants Scholarship Programme, SEARMET. Lecturers of the VMDT curriculum participate in international collaboration projects and are co-supervisors, opponents and members of defence committees of foreign universities.

Staff collaboration

Interdisciplinary and inter-chair research topics, in which the role of co-supervisors of PhD theses plays an important role, facilitate collaboration of academic staff. 76% (19/25) of PhD students who have entered PhD studies since 2017 have a co-supervisor. More experienced academic staff support younger ones in developing their supervisor skills. PhD students' presentation conferences and evaluation promote collaboration of academic staff.

PhD courses are often taught by academic staff from foreign universities who help to establish foreign contacts. All opponents of PhD theses are from higher education institutions, research institutions or companies from outside Estonia.

Assessment of academic staff performance

Feedback on the academic staff member's work, the effectiveness, professional development and management skills takes place during performance reviews and evaluation. *Via* the University document management system, the academic staff member fills in the performance review questionnaire, followed by an interview with the direct organiser of work, and mutual agreements related to the job are formulated together. Performance review questionnaire includes an annual report form for the academic staff member, which can be filled in on an ongoing basis and used as a basis for compiling both the performance review questionnaire and the evaluation report. The direct organiser of work monitors the tasks according to the academic staff position description and minimum requirements of the academic staff member and their recommended share. The purpose of performance assessment is to advance the academic career of an academic employee. The results of the work of an academic staff member and the compliance with the requirements for the position are assessed at evaluations at least once every five years. Upon the evaluation, the academic staff member submits a report on the assessment period, which is an evidence-based self-analysis consisting of materials certifying the competence of the academic staff member in the field of teaching, research and development or creative activities. Department of Academic Affairs adds a summary of the students' feedback on the studies performed by the evaluated staff member.

Students give feedback to academic staff *via* feedback survey based on whether their attitude towards teaching/studies was supportive of learning and open to students, and whether the staff member taught the subject masterfully, i.e. sparkled interest, presented the material in an understandable and engaging way.

For evaluation, the direct organiser of work of the academic staff member submits an assessment of the evaluated staff member's work results. On the basis of this information, the evaluation committee evaluates the academic staff member and prepares the evaluation decision.

Members of the evaluation committee are academic staff with experience in academic work and no conflicts of interest with the person being evaluated. One member of the evaluation committee must be from outside the institute of the person to be evaluated.

Evaluation has a central role in the career model of academic staff, as it assesses the suitability to perform the duties of the position and creates a basis for promotion of an academic staff member. If the employee has fulfilled the requirements for a higher career level and achieved the goals agreed in the employment contract, the evaluation committee shall make a proposal to the Rector to promote the employee to the next career level. In case of non-compliance, it is possible to give the employee up to one year to improve the work performance, or the employer initiates an extraordinary termination of the employment contract.

Staff workload

Staff workload and expected time for **research, teaching and supervising** is agreed upon conclusion of the employment contract and shall be fixed in the employment contract or the job description attached thereto. Amendments are made depending on needs and changing situations. Director of the institute as the employer has the competence to make changes in the employment contracts.

Contribution of academic staff to society

Academic staff participates in the work of non-university academic and administrative bodies and committees, in advisory and expert activities related to the field, and in popularisation of their field. Academic staff present at scientific conferences and seminars, provide continuing education courses and training for companies and public institutions, compile guides and information materials, and publish popular science articles.

Strengths, areas for improvement and planned development activities

<table>
<tr><th colspan="2">Strengths</th></tr>
<tr><td colspan="2">• Competent academic staff and supervisors are internationally recognised as researchers
• Good international collaboration
• Co-supervisors are young academic staff members recently defended the PhD</td></tr>
<tr><th>Areas for improvement</th><th>Planned activities</th></tr>
<tr><td>• Young research staff succession
• Competence of supervisors in narrower fields of science
• Level of publication of academic staff who have just defended their PhD theses</td><td>• Courses and training of beginning PhD supervisors
• Analysis of the development of chairs, the professional needs of academic staff and PhD students at the institute, incl. need for funding and succession
• Development of institute's strategy for PhD student places and highlighting new research topics
• Development of interdisciplinary PhD studies between chairs
• Involvement of newly defended PhD students in research projects</td></tr>
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