



CENTRE FOR QUALITY ASSESSMENT IN HIGHER EDUCATION

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**EVALUATION REPORT  
STUDY FIELD OF ENVIRONMENTAL ENGINEERING  
AT KAUNAS UNIVERSITY OF TECHNOLOGY**

**Expert panel:**

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2. **Prof. dr. Tone Merete Muthanna**, *member of academic community*;
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4. **Prof. dr. Dalia Štreimikienė**, *representative of social partners*;
5. **Tadas Paukštys**, *students' representative*.

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Report language – English

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### Study Field Data\*

Title of the study programme	<i>Environmental Engineering</i>	<i>Sustainable Management and Production**</i>
State code	6211EX003	6213EX001
Type of studies	University studies	University studies
Cycle of studies	Second cycle, graduate (Master's)	Second cycle, graduate (Master's)
Mode of study and duration (in years)	Full-time studies (2 years)	Full-time studies (2 years)
Credit volume	120	120
Qualification degree and (or) professional qualification	Master of Engineering Sciences	Master of Engineering Sciences
Language of instruction	Lithuanian/English	Lithuanian/English
Minimum education required	Bachelor degree or its equivalent*	Bachelor degree or its equivalent*
Registration date of the study programme	16/12/1992	26/09/2001

\*Additional requirements described in SER chapter 3.1

\*\*Interdisciplinary study programme

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## I. INTRODUCTION

### 1.1. BACKGROUND OF THE EVALUATION PROCESS

The evaluation of study fields is based on the Methodology of External Evaluation of Study Fields approved by the Director of the Centre for Quality Assessment in Higher Education (hereafter – SKVC) 31 December 2019 Order [No.V-149](#).

The evaluation is intended to help higher education institutions to constantly improve their study process and to inform the public about the quality of studies.

The evaluation process consists of the main following stages: 1) *self-evaluation and self-evaluation report prepared by Higher Education Institution (hereafter – HEI)*; 2) *site visit of the expert panel to the higher education institution*; 3) *production of the external evaluation report (EER) by the expert panel and its publication*; 4) *follow-up activities*.

On the basis of this external evaluation report of the study field SKVC takes a decision to accredit study field either for 7 years or for 3 years. If the field evaluation is negative then the study field is not accredited.

The study field and cycle are **accredited for 7 years** if all evaluation areas are evaluated as exceptional (5 points), very good (4 points) or good (3 points).

The study field and cycle are **accredited for 3 years** if one of the evaluation areas was evaluated as satisfactory (2 points).

The study field and cycle are **not accredited** if at least one of evaluation areas was evaluated as unsatisfactory (1 point).

### 1.2. EXPERT PANEL

The expert panel was assigned according to the Experts Selection Procedure (hereinafter referred to as the Procedure) as approved by the Director of Centre for Quality Assessment in Higher Education on 31 December 2019 [Order No. V-149](#). The site visit to the HEI was conducted by the panel on 9<sup>th</sup> of December 2021. The visit was organised online using video-conferencing tool (Zoom).

**Prof. dr. Edoardo Patelli**, *professor at University of Strathclyde (United Kingdom);*  
**Prof. dr. Tone Merete Muthanna**, *professor at Norwegian University of Science and Technology (Norway);*  
**Prof. dr. Toomas Tamm**, *professor at Estonian University of Life Sciences (Estonia);*  
**Prof dr. Dalia Štreimikienė**, *Lithuanian energy institute (Lithuania);*  
**Tadas Paukštys**, *student at Klaipeda State University of Applied Sciences (Lithuania).*

### 1.3. GENERAL INFORMATION

The documentation submitted by the HEI follows the outline recommended by SKVC. Along with the self-evaluation report and annexes, the following additional documents have been provided by the HEI before, during and/or after the site visit:

No.	Name of the document
1.	

### 1.4. BACKGROUND OF THE STUDY FIELD/STUDY FIELD POSITION/STATUS AND SIGNIFICANCE IN THE HEI

The KTU provides research-led studies to support interdisciplinary knowledge and innovative technologies for sustainable development supported by a creative environment which inspires leaders and talented individuals. The KTU provides studies in 43 bachelor's, 51 master's and 1 integrated study program, 43 of them are provided in the English language in the fields of mathematics, informatics, physical sciences, engineering, technologies, health, social, educational sciences and humanities, arts, business, and public management.

KTU was the first higher education institution in Lithuania to launch Environmental Engineering (EE) studies in 1988. In 2002, in cooperation with the BALTECH consortium, a master's SPs in Environmental Management and Cleaner Production was launched at the Institute of Environmental Engineering (APINI), KTU. The SP has been accredited twice in a row for a maximum period of 6 years (2007 and 2013). In 2017, the interdisciplinarity of the SP was confirmed, integrating EE (main field) and manufacturing engineering and business, awarding graduates a master's degree in engineering. Since 2017–2018, in line with the interdisciplinary nature of the SP, the change of the title to Sustainable Management and Production has been approved. The study programs in Environmental Engineering complies with the requirements of the European standards of higher education. The study field of EE at KTU was acknowledged as fulfilling the requirements and was granted permission to enrol students in 2018–2019.

Contrary to the situation in neighbour countries, the popularity of environmental SPs in Lithuania has recently declined, especially for bachelor's SPs. Despite the marketing efforts, the bachelor's SP Environmental Engineering and Technology did not attract profitable numbers of enrolling students and therefore discontinued. The date of termination of the study program is June 30, 2022. Admission to this program is not in progress.

## II. GENERAL ASSESSMENT

**Environmental Engineering** study field and **second cycle** at **Kaunas University of Technology** is given **positive** evaluation.

*Study field and cycle assessment in points by evaluation areas*

No.	Evaluation Area	Evaluation of an Area in points*
1.	Intended and achieved learning outcomes and curriculum	4
2.	Links between science (art) and studies	5
3.	Student admission and support	3
4.	Teaching and learning, student performance and graduate employment	4
5.	Teaching staff	4
6.	Learning facilities and resources	4
7.	Study quality management and public information	4
	Total:	28

*\*1 (unsatisfactory) - the area does not meet the minimum requirements, there are fundamental shortcomings that prevent the implementation of the field studies;*

*2 (satisfactory) - the area meets the minimum requirements, and there are fundamental shortcomings that need to be eliminated;*

*3 (good) - the area is being developed systematically, without any fundamental shortcomings;*

*4 (very good) - the area is evaluated very well in the national context and internationally, without any shortcomings;*

*5 (excellent) - the area is evaluated exceptionally well in the national context and internationally.*

### III. STUDY FIELD ANALYSIS

#### 3.1. INTENDED AND ACHIEVED LEARNING OUTCOMES AND CURRICULUM

*Study aims, outcomes and content shall be assessed in accordance with the following indicators:*

*3.1.1. Evaluation of the conformity of the aims and outcomes of the field and cycle study programmes to the needs of the society and/or the labour market (not applicable to HEIs operating in exile conditions);*

##### *(1) Factual situation*

The SER summaries the alignment of the study programs with the international specialisation of environmental engineering and further down the EU needs and ambitions.

Further the SER summaries the study program aims and learning outcomes: SP Sustainable Management and Production is an internationally recognised SP, accredited under the QUESTE-SI quality assurance system as the best engineering SP in Europe educating professionals in sustainable industrial development (in 2012, when the assessment was carried out, the title was Environmental Management and Cleaner Production; during the preparation of the previous self-assessment, a QUESTE-SI assessment was carried out in parallel). According to the data published in the journal „Reitingai“ 2019, KTU Environmental engineering (EE) studies are recognised as the best in the country.

In EE study field SPs at KTU, a considerable proportion of students have practical work experience in manufacturing and other organisations and choose to study for a master's degree with the aim of raising their qualifications by acquiring the competences useful in their positions. This demonstrates a direct market need to expand the knowledge and skills of employees. More and more companies address KTU for training which could help industrial companies understand the possibilities of implementing engineering solutions to the circular economy, eco-innovation and other sustainability challenges in production, design, and material flow management processes, both internally and in cooperation with other companies (industrial symbiosis, industrial ecology, supply and value chains, etc).

##### *(2) Expert judgement / indicator analysis*

The Study programs align with society's needs and the national labour market. The SER comments that most of the students in the study programs have work experience coming into the programs demonstrate the societal need for continuing education in the field.

*3.1.2. Evaluation of the conformity of the field and cycle study programme aims and outcomes with the mission, objectives of activities and strategy of the HEI;*

##### *(1) Factual situation*

The aim of the SP Environmental Engineering is to provide students with the knowledge and skills to apply a sustainable development approach for complex environmental problem

solving, to develop sustainable EE solutions combining legal, social and economic aspects. Students acquire strong research-based competences and develop critical thinking. The main focuses of this SP are advanced technologies (BioTech, GreenTech, NanoTech, etc.); circular and bio-economy, resource conservation and recovery; organisation and implementation of environmental research; assessment and modelling of environmental systems and technologies; innovative, value-added technological solutions; and technological business development. The aim of the SP Sustainable Management and Production is to provide interdisciplinary competencies relevant for analysis of business, industrial and regional sustainability challenges and for development and integration of economically sound and environmentally as well as socially beneficial innovations, in order to manage sustainability risks and identify innovative business opportunities. Graduates will be able to understand the interdependence and interactions between economic and technological solutions, innovation, market, policies and the environment. Graduates have a strong understanding of applied engineering and the life cycle approach, as well as an exceptional ability to critically assess the quantitative and qualitative implications of various decisions from environmental, economic and technological perspectives. They can contribute effectively to the value chain creation, production and management alignment with limited natural resources and their sustainability in order to manage business and production risks and ensure competitiveness. The acquired competences contribute to solving global challenges with localised tools and methodologically and systematically based solutions.

The uniqueness and rationality for implementation of the SPs in the study field of EE at the University was assessed by a working group established by the Decree No. PP-92 of the Vice-Rector for Studies as of 28/11/2017. The objective of this working group was to provide concrete proposals to the University Study Program Committee (SPC) regarding the implementation of the SPs Environmental Engineering and Sustainable Management and Production.

The University's mission, vision (presented in the Introduction) and strategy are aimed at strengthening KTU's responsibility to the society and the country by consolidating its activities to improve the quality of human life and accelerate the development of statehood. The most important activity in this direction is the shaping and transmission of the University's contribution to the vitality of the country and its sustainable economic, social and cultural, knowledge-based development. It must be noted that the aims and learning outcomes of both SPs are in line with KTU's mission, vision, strategic activities, and objectives. The SPs are oriented towards providing research- based international level studies and towards the creation and transfer of knowledge and innovative technologies for sustainable development of the state and innovation. The SPs also actively contribute to the implementation of the following strategic activities of the University: development of the competence of students to ensure their self-expression and successful career; creation and transfer of internationally recognised knowledge and technologies; and concentration of the University's activities towards human well-being and sustainable development of the state.

## *(2) Expert judgement/indicator analysis*

The SPs align with the HEI strategy by strengthening KTU's responsibility to society and the country by consolidating its activities to improve the quality of human life and accelerate the development of statehood. The EE study programs clearly contribute to these goals. The committee finds very good overall alignment. Figure 1.1 from the SER is a very good visual representation of this alignment.



### *3.1.3. Evaluation of the compliance of the field and cycle study programme with legal requirements;*

#### *(1) Factual situation*

The SER describes how both second circle SPs meet the requirements of the University, as well as national and European legislation. The compliance of the SPs with the programme structure requirements set out in the General Requirements for the Implementation of Studies approved by the Order of the Minister of Education and Science of the Republic of Lithuania No V-1168 as of 30/12/2016 is summarised in SER Table 1.1. Detailed descriptions of the SPs are provided in the SER, Annex 1. The compliance of teachers with the requirements of this legal act is analysed in Section 5 of the SER.

#### *(2) Expert judgement/indicator analysis*

The committee finds that both study programmes comply with all laws and regulations at national and at EU level.

### *3.1.4. Evaluation of compatibility of aims, learning outcomes, teaching/learning and assessment methods of the field and cycle study programmes;*

#### *(1) Factual situation*

The aims and learning outcomes of the SPs in the field are achieved through the aims and learning outcomes set by the individual Study Modules (SM). The SMs and their syllabi are designed to provide students with the knowledge, understanding and skills necessary to achieve the aims of the SPs. The learning outcomes of the SMs are designed to effectively deliver the SP learning outcomes. Teachers select the study and assessment methods according to the outcomes to be achieved, their level of complexity and the objective of ensuring that the learning outcomes are achieved. At the SP level, assessment methods are coordinated across SMs. The links between SP outcomes, SM outcomes, study and assessment methods are based on the principle of constructive alignment, which is applied in accordance with Bloom's taxonomy. For example, in the SP Environmental Engineering, the most common methods of study for acquiring knowledge are lectures and debates, and a midterm or final exam assesses the skills acquired, while the most common methods of study for acquiring fundamental and applied research skills are individual or team projects and laboratory work, along with reports to assess the skills. For development of engineering analysis and design, practical work and personal and social skills, the most common study methods are lectures by invited guest lecturers/practitioners, experiential learning, group work, simulations, while the most common method of assessment is the oral illustrated presentation. Increasingly, study methods covering all skill sets are being used, such as problem-based learning, challenge-based learning, while assessment of skills is conducted through problem-solving tasks or reflection on performance.

The coherence of the aims and the learning outcomes of the SPs with the learning outcomes, study methods and assessment methods of the SPs and SMs is systematically mapped and presented in SER, Annex 2. Lectures are the most often used tools for delivering classes, but they are often complemented by others approaches to reach the objectives of study program including individual project, discussion, tutorial, case study and group.

The SPs learning outcomes cover the six groups of competences defined in the EUR-ACE standard and comply with the components indicated in the description of the study cycles:

knowledge and skills, engineering analysis, engineering design, fundamental and applied research, practical skills in engineering problem-solving, and personal and social skills.

The curricula of the SPs and the descriptions of the SMs are continuously updated, not only to improve the content of the SMs (adapting the topics to the latest relevant research findings), but also to focus on the revision of didactics. The necessary corrections are made in accordance with the academic year deadlines and the requirements of the University. The KTU Edu\_Lab training, consultation and methodological tools enable teachers to adapt advanced study methods (e.g., problem-based, challenge-based, collaboration-based or design-based learning) and to select appropriate assessment methods.

#### *(2) Expert judgement/indicator analysis*

The learning aims and outcomes are described as aligned with the teaching methods and assessment. The teaching methods seem predominantly based on lectures, complemented with additional approaches as stated above. The assessment seems more differentiated and not only based on written exams. The committee recognises the diversity on delivery and assessment used and encourages the study program to maintain such diversity and if feasible investigate the feasibility of a further wider range of assessment methods and teaching formats.

#### *3.1.5. Evaluation of the totality of the field and cycle study programme subjects/modules, which ensures consistent development of competences of students;*

##### *(1) Factual situation*

Since the last evaluation, the SP Environmental Engineering has been continuously updated and now focuses not only on improving the environment, but also on adding value to business and society, emphasising the potential of technological entrepreneurship and the importance of the integration of advanced technologies. The changes that need to be noted here include the reorganisation of the technological SMs focusing on water, wastewater, effluent, and waste treatment by removing the sets of technological alternatives and the traditional EE SMs they contained. In their place, new SMs Resource Recovery Technologies and Eco-Entrepreneurship Project have been introduced into the SP. A new 6-ECTS SM Environmental Nanotechnology has been added to the SP following the reduction of ECTS in Research Project 2 (leaving 12 ECTS instead of the 18 ECTS previously). Besides, a 6-ECTS SM Environmental Biotechnology has been added to the core study field subjects. This has restructured the SP which was previously focused on the treatment and management of specific waste streams.

The SER further gives a very good overview of the subjects and modules in figure 1.3 through figure 1.5.

##### *(2) Expert judgement/indicator analysis*

The committee finds a consistent and well developed cycle of the study programmes with subjects and modules. The SER describes a good process of review and implementation of improved measures since the previous evaluation.

#### *3.1.6. Evaluation of opportunities for students to personalise the structure of field study programmes according to their personal learning objectives and intended learning outcomes;*

### *(1) Factual situation*

The SP Environmental Engineering has had a possibility of the MA+ study individualisation since the beginning of this scheme at the University, which allows students to personalise their Master's studies by choosing MA+ competence from two paths of the SP – field expert or interdisciplinary expert. Having chosen MA+ competence, a student obtains additional skills and abilities and finds new career prospects. The student, who chooses the path of a field expert, deepens the knowledge and strengthens the skills in the major study field (comprehensive knowledge and skills in the field required for the solving of research tasks). The student, who chooses the path of an interdisciplinary expert, obtains the knowledge and skills in another study field or area (the fields of various knowledge and skills are combined for the solving of specific tasks).

University offers MA+ competences (change management, business processes and supply chains management, data analytics, process validation, etc.) implemented in cooperation with high-level business and public sector.

Master students choose their master's degree project topic in the first semester. The themes are submitted to the Academic Information System (AIS) by KTU academic and pedagogical staff, social partners, and may also be proposed by students. Although the master's final degree project is prepared and defended during the 4th semester, students can test the studied methodologies paying their focus on the final degree project object or research area already in semester projects, module-related projects, or individual work. Such a framework enables the adaptation of the theoretical knowledge of the SMs into practice, since the research is carried out in real companies, regional facilities or operating systems, where students analyse real problems of organisations and regions in the context of global challenges, and look for localised solutions and risk management options.

Students enrolled in 2016 were the first who had a possibility of choosing the study field expert or interdisciplinary expert track. An analysis of the last five years shows that in the first year, almost all students chose the interdisciplinary expert track, while in the following years, students prioritised the study field expert track. As it can be seen in Fig. 1.3, over the last three years, on average, around 30% of the SP students have chosen the track of an interdisciplinary expert and the remaining 70% have chosen the track of a study field expert. The profile of the students entering the SP has also changed over the analysed period, with a higher proportion of graduates from other fields or other universities preferring the study field expert track. Looking at the interdisciplinary MA+ competences chosen by students (Fig. 1.6), it can be seen that around 60% of students chose one of three competences: responsibility for sustainable development, project management or leadership.

### *(2) Expert judgement/indicator analysis*

The study programs offer a wide range of personalization opportunities for the students both within the study program and in collaboration with other study programs, like the connection to MA+ as mentioned in the SER. The panel appreciates the use of different interdisciplinary methods as shown in SER Annex 1-2 to solve circular economy challenges through the whole life cycle of the product/service integrating collaboration with the stakeholders in SPs.

#### *3.1.7. Evaluation of compliance of final theses with the field and cycle requirements.*

### *(1) Factual situation*

The preparation and defence of final degree projects are regulated by KTU Guidelines for the Preparation and Defence of Final Degree Projects and Methodological Requirements for the preparation and Defence of Final Degree Projects and recommendations, to ensure compliance of the final degree projects with the SP specifics and acquired learning outcomes. Detailed requirements, recommendations and processes are provided for students in MOODLE of final degree projects.

The topics (thematics) of final degree projects can be proposed by any academic employee of the University with regards to the correlation between his/her research activities and the expected results of a specific SP. The project topic (thematic) can be proposed by the University's social partners and students, in coordination with the possible supervisor (lecturer or researcher of the University). The topics (thematics) submitted by the University's science institutes and/or industrial, business and public sector institutions are included in the lists of the final degree project topics (thematics) for the second cycle studies. SPC of the Faculty of chemical technology (CTF) (Environmental Engineering) and Interdisciplinary Integrated Engineering SPC (Sustainable Management and Production) assess the proposed topics (themes) for projects, their compliance with the study fields and approve the list of the topics (thematics) offered to the students. The topics of final degree projects are publicly available in the University's internal cyberspace intended for students. When choosing their project topics, the students consult with their supervisors, the heads of the SPs of the field (hereinafter – SPV), the lecturers and the researchers. After choosing the topic, the students prepare their final degree project independently, with consultations of their supervisors.

A final degree project is defended in the public meeting of the Qualification Commission of the study field. The commission for the assessment of the final degree project and its defence consists of the competent scientists of the study field, the practitioners-professionals, the representatives of employers. The commission has a minimum of 5 members, at least one commission member is from another institution.

## *(2) Expert judgement/indicator analysis*

The process from topic selection to defence is described in detail demonstrating strong programmes with a clear plan and vision for the learning outcomes for the thesis work.

### ***Strengths and weaknesses of this evaluation area:***

#### ***(1) Strengths:***

1. Clearly aligned aims and strategies between the HEI and the study programmes.
2. Clearly defined outcomes and connected teaching methods and measures.
3. Variety of assessment methods including oral examination/presentation, project reports.

#### ***(2) Weaknesses:***

1. No obvious weaknesses are identified but some modules are still using mainly traditional based education and learning.

### 3.2. LINKS BETWEEN SCIENCE (ART) AND STUDIES

*Links between science (art) and study activities shall be assessed in accordance with the following indicators:*

*3.2.1. Evaluation of the sufficiency of the science (applied science, art) activities implemented by the HEI for the field of research (art) related to the field of study;*

*(1) Factual situation*

Kaunas University of Technology received a score of 4 out of 5 in a comparative assessment by the Research and Higher Education Monitoring and Analysis Centre (MOSTA, from 01-08-2019 Government Strategic Analysis Centre STRATA) in research and development activities in the field of Environmental Engineering with a development potential of 5 out of 5.

The University also has a strong collaboration at international level with 69 projects during the review period as well as good activities in knowledge exchange with 33 startup's created. The total number of academics involved in research activities is also increasing over the years (SER, Table 2.1).

*(2) Expert judgement/indicator analysis*

The panel finds a consistent and clear improvement on the impact of research. The main research activities targeting peer-reviewed international journals have been identified such as the Journal of Chemical Technology, the Journal of Cleaner Production, the Journal of Environmental Science and Pollution Research, The Science of the Total Environment.

*3.2.2. Evaluation of the link between the content of studies and the latest developments in science, art and technology;*

*(1) Factual situation*

Air quality improvement technologies, water and wastewater treatment technologies, waste management and resource recovery technologies are integrated into the programme study as detailed in paragraph 105 of the SER. Good relevance to data analytics and modern technologies.

The partnership with Wetsus (Center of Excellence for Sustainable Water Technology, Leewarden, the Netherlands), BalticNet PlasmaTec (Science-industry cluster for plasma technologies, Greifswald, Germany) and ESSSR (European School of Sustainability Science and Research, Hamburg, Germany) are particularly welcome since this will contribute to the content (and quality) of the studies.

Good plan for applying R&D. Most of the research output seems coming from a single research group (i.e. the group led by prof. D. Martuzevičius).

*(2) Expert judgement/indicator analysis*

Research and Development strategy for 2015-2020 provided a clear link with the latest development in science and technology although the Research and Development strategy for the 2020-2025 are not presented in the report but highlighted in the discussion with Senior management staff of the university.

The panel finds the role of renewable energy sources is unclear (Paragraph 121 of the SER) and the inclusion of the concept of smart cities in the study programme is not described in detail (Paragraph Research and Development 122 of the SER).

### *3.2.3. Evaluation of conditions for students to get involved in scientific (applied science, art) activities consistent with their study cycle.*

#### *(1) Factual situation*

Good internationalisation of the research as summarised in Annex 5 of the SER. Good cooperation with international partners. Agreement with the University of Bologna in 2015 with a dual doctoral degree.

#### *(2) Expert judgement/indicator analysis*

The panel recognises the good practice to carry out research by the Master students in the research groups with interaction with PhD students and research fellows.

The panel also notices that the publications involving students are increasing over time, although overall publications seem to be reduced most likely due to the reduction in the number of PhD students.

Only 2 out of 12 students in SP Environmental Engineering (8%) published 3 international research articles (proceeding of conferences) together with co-authors. Better research output from SP Sustainable Management and Production (6 out 15).

### *Strengths and weaknesses of this evaluation area:*

#### *(1) Strengths:*

1. The financial sustainability is provided in Table 2.4 showing a continuous increase of research income although international contribution remains limited.
2. Good practice to carry out research by the Master students in the research groups with interaction with PhD students and research fellows.
3. There is a good and sustained interaction with industry.
4. Good links with international institutions and in particular the joint PhD Programme with the University of Bologna (Italy) providing excellent mobility opportunities for students and staff.

#### *(2) Weaknesses:*

There are no significant weakness in the links between science (art) and study activities.

The panel however recommends attention to the following factors that may influence the quality of the programme in the new future:

1. Small number of PhD students and the trend seems also to be negative. This is likely to affect the engagement of Master students in scientific activities.
2. Some of the key staff members are getting close to the retirement age and a clear strategy to attract top researchers should be developed as soon as possible.

## **3.3. STUDENT ADMISSION AND SUPPORT**

### *Student admission and support shall be evaluated according to the following indicators:*

#### *3.3.1. Evaluation of the suitability and publicity of student selection and admission criteria and process:*



### *(1) Factual situation*

Student admission to KTU is carried out in accordance with the Rules of Student Admission to KTU, hereinafter referred to as the Rules, approved by the KTU Senate by 1st of December each year. Admission to the master's SP is organised in three stages. The dates of the admission procedures are approved by the order of the Rector of the University and are announced publicly.

Students who wish to be admitted to the SP Environmental Engineering must have a bachelor's university degree in the study fields of Engineering, Technology, Physics, Health, Life, Veterinary or Agricultural sciences or a professional (college) bachelor's degree in analogous the study fields, along with 60 ECTS of supplementary studies.

40% of the applicants indicated a state-funded place in the SP Environmental Engineering in 2017–2020 admissions. For the SP Sustainable Management and Production for state-funded places as first priority was 57.1% in 2017, 70.6% in 2018, 56.5% in 2019 and 47.6% in 2020.

The numbers of applications for state-funded places for SP in Sustainable Management and Production and Environmental Engineering were: 2017 28/25 2018 17/18 2019 23/22 2020 21/30.

The numbers of applications for non state-funded places for SP in Sustainable Management and Production and Environmental Engineering were: 2017 7/1 2018 5/2 2019 2/1 2020 2/3.

The number of signed agreements for both SPs was 22 in 2017, 20 in 2018, 22 in 2019 and 20 in 2020 and detailed distribution is shown in Fig. 3.2 of SER.

The gender (men/women) distribution of admitted students in the SP Environmental Engineering was 40/60 in 2017 and 2018, 30/70 in 2019 and for the SP Sustainable Management and Production was 42/58 in 2017, 50/50 in 2018 and 36/64 in 2019.

The ranking of applicants for admissions to the SP is based on the competition score.

### *(2) Expert judgement/indicator analysis*

The panel finds that the student selection and admission criteria and the admission process are adequate and fair as indicated by the students during the visit. The KTU students are aware of the difficulty of reaching and the minimum needed score to study at KTU. There have not been any complaints.

### *3.3.2. Evaluation of the procedure of recognition of foreign qualifications, partial studies and prior non-formal and informal learning and its application;*

#### *(1) Factual situation*

The learning outcomes achieved at other higher education schools and via non-formal education are included in accordance with the KTU Guidelines for the Inclusion of Learning Outcomes and clearly described in other KTU documents provided in Self-evaluation report.

The SMs of the student, who wants the learning outcomes of his/her previous formal education to be included, are included after the evaluation of their compliance with the formal requirements of the SP (study field, study cycle, mode of studies, etc.) and the subject requirements.

The University applies the evaluation of the learning achievements acquired via non-formal and informal education and the acknowledgement of competences that allows the person's competences acquired via non-formal education to be evaluated and acknowledged as the learning outcomes. A candidate can apply regarding the evaluation of his/her learning achievements obtained in the work activities, non-formal adult educational system, unpaid work and volunteering, traineeships, courses, seminars, projects, and independent learning. All the students, who are eligible according to the conditions of the organisation and financing of partial studies or comply with the requirements of the EU „Erasmus+“ programme, can complete partial studies at other higher education schools. The student has to coordinate the plan of partial studies and the inclusion of learning outcomes with the faculty's Vice-Dean for Studies in advance.

## *(2) Expert judgement/indicator analysis*

The KTU provides specific guidelines for recognition of foreign qualifications, partial studies and other types of education methods. For instance, candidates can present their achievements in activities such as relevant to engineering work activities, non-formal adult educational system, unpaid work and volunteering, traineeships, courses, seminars, projects, and independent learning. Although such procedures are in place and students are aware of that, according to the interview with KTU students, the panel finds that the procedures to recognise credits/qualifications are only partially adopted.

There is limited mobility of students with 145 ECTS recognised for students in EE who went abroad for part-time studies in 2016-17, 56 ECTS in 2017-18 and 25 in 2018-19 (no students from the SP in Environmental Engineering went abroad in 2017-18 and 2018-19). Understandable there was no student mobility in the spring 2020 due to the impact of the global pandemic.

### *3.3.3. Evaluation of conditions for ensuring academic mobility of students;*

#### *(1) Factual situation*

The KTU ensures high quality of higher education, sharing of the latest knowledge and skills, promoting the mobility of students and international cooperation, the students are provided with an opportunity to complete an international internship or partial studies abroad.

The partial studies and internships under the „Erasmus+“ programme can be completed in all the EU states, United Kingdom, Turkey, Iceland, Norway, Lichtenstein, Northern Macedonia, Serbia, Azerbaijan, Israel, Kazakhstan, Ukraine, USA, South Korea, Mexico, Ecuador, etc. The minimum duration of this internship is 3 months.

The students can also complete the exchange studies of 1-2 semesters or summer/winter programmes abroad under the bilateral cooperation and student exchange agreements signed between KTU and the university partners.

In order to expand international cooperation, KTU cooperates with ECIU University. ECIU supposedly is a completely new University model based on the needs of society, citizens and industry.

The University has registered the brand „KTU DISCOVERed International Student Exchange“ which is used for publicity of various mobility opportunities for KTU students.

#### *(2) Expert judgement/indicator analysis*



The panel finds that excellent mobility opportunities are provided to students. The opportunities and events are listed on the university website. A number of dedicated events to promote student mobility are organised by the University (some events are organised on a monthly basis like „Discovery info point” and „Cafe Erasmus” others like „Go abroad fair” twice a year.

There are some incoming students from abroad (2 admitted to the SP Environmental Engineering for full-time studies in 2018, and one in 2019 and in the period 2017-19 5 foreign students were enrolled on the SP Sustainable Management and Production for full-time studies).

In 2016–2019, 4 students from the SP Environmental Engineering students went to study abroad. 2 students of the SP Sustainable Management and Production went for periods of study abroad in 2016–2017, 4 students in 2017–2018 and 1 student in 2018–2019. Overall there is a good balance on student mobility (incoming vs outgoing students). The SER recognised that student participation in mobility is not particularly high, mainly due to students work activities but the panel recognises the effort of KTU to improve the situation.

#### *3.3.4. Assessment of the suitability, adequacy and effectiveness of the academic, financial, social, psychological and personal support provided to the students of the field;*

##### *(1) Factual situation*

The University provides comprehensive academic, financial, social, personal, psychological support for students. The related information for students is provided at KTU Student Information and Service Centre and on KTU website.

KTU provides complex academic support to students: „GUIDed” Mentorship Programme, „GIFTed” Talent Academy, bridging courses of basic SMs (English language, mathematics, physics, chemistry, information technologies) for the first year students of the first cycle, individual consultations by lecturers.

The University applies for the tuition fee exemptions in special cases, offers the following possibilities of financial support and incentives: a) the University’s talent scholarships are awarded to the most active students who achieve exceptional academic, research and art results, are active participants in the extracurricular business, innovations and public activities; b) the nominal Patron’s (Sponsor’s) scholarships and the scholarships by enterprises are awarded to the University’s students who achieve high academic results and are actively involved; c) the one-off incentive scholarships can be awarded for active participation in the extracurricular activities – membership of student organisations, art societies or sports teams, volunteering, fostering of the University’s welfare, etc.

KTU has established the Foundation of International Scientific Events which supports the international activities of the University’s community.

The students with disabilities have the possibility to be awarded the targeted payments for special needs, partial compensation for the costs of studies if they are admitted to the state non-funded place, a social scholarship, and a reduced fee for accommodation in the dormitory.

KTU encourages the social life of students and offers them to get involved in the activities of the non-formal educational programmes: Programme WANTed, talent development platform GIFTed, mentorship programme GUIDed, the activities of the programme UNITED, and the activities of the programme INSPIRed.

The University aims to provide comprehensive psychological and personal support to its students by appointing tutors and mentors, offering the possibility to apply to psychologists, a chaplain, a coordinator of pastoral care or a personal health care institution free of charge.

## *(2) Expert judgement/indicator analysis*

The panel finds that the KTU has special programs to encourage the social life of students and offers the opportunity to get involved in other activities. KTU supports people with disabilities to be involved in the community of their chosen field. KTU also provides student support in academic, financial, social, psychological and personal fields.

### *3.3.5 Evaluation of the sufficiency of study information and student counselling.*

#### *(1) Factual situation*

The booklet is provided to the students admitted to the SPs and the communication is conducted via email. One week before their studies, the students participate in the event „Welcome Week” where they learn about the procedure of studies, the available information systems, the procedure of making a study plan, the timetables of classes, the scholarships, the services of the Library, the possibilities to go abroad, the mentorship programme, the activities of the faculty's Students' Association.

During the first class of each subject, the lecturer presents the programme of the subject, its objectives, the expected learning outcomes, as well the procedure of the evaluation of the SM's results and the structure of evaluation.

The students are constantly provided with consultation on the issues of studies, academic and other support. The information and documents relevant to students are provided at KTU intranet Office365.

The University also runs the Study@KTU Ambassadors programme. Study@KTU Ambassadors are a group of outstanding students selected to represent the University to prospective students, their families and the community.

The students' interests are represented by KTU Students' Association and in the case of the SP Environmental Engineering, the students' union of the CTF; and in the case of the SP Sustainable Management and Production, the students' union of the MIDF Students' Association.

#### *(2) Expert judgement/indicator analysis*

The panel finds a variety of digital resources, booklets with the most relevant information about studies provided by the KTU. Feedback is used to improve the quality of studies; it is one of the most important components of ensuring and implementing changes that affect the University and its community, however, some students are not fully aware of the career management systems and different ways to provide feedback.

The panel finds that Study@KTU Ambassadors positively enhances international understanding and friendship through educational, cultural and humanitarian activities and KTU Students' Association has a beneficial impact on the distribution of scholarships, loans, benefits and decision-making, conducting the surveys on the issues relevant to students.

### ***Strengths and weaknesses of this evaluation area:***

#### ***(1) Strengths:***

1. Good staff sufficiency in student counselling.
2. Established support for people with disabilities.
3. Excellent mobility opportunities for students.

#### ***(2) Weaknesses:***

1. KTU organises events and support for students including a career management system, but it seems that not all the students have been sufficiently informed about those activities.

### **3.4. TEACHING AND LEARNING, STUDENT PERFORMANCE AND GRADUATE EMPLOYMENT**

*Studying, student performance and graduate employment shall be evaluated according to the following indicators:*

*3.4.1. Evaluation of the teaching and learning process that enables to take into account the needs of the students and enable them to achieve the intended learning outcomes;*

#### ***(1) Factual situation***

The form of studies of the SPs is full-time studies; they include classroom work (lectures, practice works, laboratory works, consultation seminars, visits to enterprises, lectures by practitioners etc.) and other individual work. Face-to face and in exceptional cases – remote or a combined form of studies was pursued during the period under evaluation.

Main classes of the SP Sustainable Management and Production are held in the afternoons at 3:30 and on Saturdays from 9 am to 3 pm as most of the students are employed. Since 2017, some of the lectures and tutorials have been delivered using Video and Adobe Connect distance learning software. This allowed students to attend lectures remotely by joining the classroom. This was useful for transition to distance learning in the spring semester 2019-2020 due to COVID-19.

The following methods of active learning are applied: project activities, design thinking, creative workshops, work in teams, study visits, discussions, interview, problem-solving sessions, activity reflection, idea maps, etc. Besides the traditional evaluation methods, new methods are used for the evaluation of achievements: portfolio of works or competences, solving of problematic tasks, engineering project, activity reflection, self-assessment, etc. Almost all courses involve individual projects, where each student individually prepares and defends an individual term paper, or group/team projects, where a group of students work on a single project.

Continuity of the study field of EE is ensured by a joint PhD programme in the field of EE implemented by KTU, Vytautas Magnus University and the Lithuanian Energy Institute. Students of this SP have the possibility to obtain a double doctorate thanks to an agreement with the University of Bologna (Italy).

#### ***(2) Expert judgement/indicator analysis***

The panel finds that the study forms and methods applied help students in the study process as they all have full jobs. Innovative teaching and learning methods are applied, especially in Sustainable Management and Production like individual work on analysis of the performance of the company in which the student is working, through identification of environmental problems, proposals and evaluation of solutions at product, process and company level. Such assignments are appreciated by the students' employers and the graduates often get better positions in companies after completing their master's degree.

The performance assessment methods that encourage students to be active are established like a cumulative assessment system consisting from the marks of intermediate assessments and final assessment, multiplied by the weighted coefficients and adding the multiplications. The additional assessment form „Evaluation of the Student's Activity (level)" is applied (up to 10% of the final mark) which evaluates the students' preparation for case analysis, active discussion, participation in debates, case analysis, etc. and this is positive.

Organisation of student's individual work and evaluation criteria are well-described and are acknowledged by students. Further opportunities for graduates to pursue studies are well-described and are acknowledged by students.

### *3.4.2. Evaluation of conditions ensuring access to study for socially vulnerable groups and students with special needs;*

#### *(1) Factual situation*

Studies are organised by implementing the Equal Opportunities and Diversity Policy and creates an open and safe environment where the individual differences of all its employees and students, their potential and contribution are recognised and valued. Every employee and student has a right to work and study in an environment that promotes respect for personal dignity. KTU aims to provide equal opportunities for studies and work to all the community members, including the disadvantaged groups of students and the students with special needs.

The consultations to the students with special needs are provided by KTU Student Information and Service Centre. The general information is provided in the section for the first year students "Adaptability of Studies for the Students with Special Educational Needs" of KTU website. The students are regularly notified about the opportunities to join the initiatives at the University and the events of the KTU community.

There is a social welfare coordinator at the Department of Student Affairs who is responsible for providing consultations if the student has issues related to studies, scholarship competitions, financial support, assistance, adaptation of studies, as well as provides the students with recommendations and guidelines related to studies and ensures full integration of students.

The flexible forms of the achievement evaluation are foreseen while assessing the learning achievements of students with special needs. There is a permanently active survey for the students with disabilities and/or learning difficulties in the section „Emotional and Physical Health" of KTU website. The goal of this survey is the identification of personal needs and help while correcting the process of studies, adapting it for individual cases, and more prompt and effective response to the needs of these students.

#### *(2) Expert judgement/indicator analysis*

The panel finds good physical conditions and a friendly environment in place to ensure the access to study for socially vulnerable groups and students with special needs. However, during the period under evaluation, there were no students with special needs among those enrolled in the SPs.

### *3.4.3. Evaluation of the systematic nature of the monitoring of student study progress and feedback to students to promote self-assessment and subsequent planning of study progress;*

#### *(1) Factual situation*

Once per year, the Department of Academic Affairs prepares an annual report of the monitoring of the students' learning outcomes and presents it to the Rector's office. This report includes the indicators of the progress of students and repeated examinations, the evaluation of the effectiveness of newly introduced measures for the quality of studies, the attendance indicators, the violations of academic ethics, the results of attendance and other information relevant to the evaluation of the quality of studies and the progress of the students' studies. As this report does not include data on individual study fields, this information is not analysed in detail in SER.

The SPC is constantly monitoring the students' achievements in the Academic Information System (AIS): overall grade point average, data of the current semester's intermediate and final assessments, records of the attendance in classes.

All SMs have active courses in the MOODLE environment, and this is also a means for an active and continuous communication with students and continuous feedback.

Informal meetings between students and teachers also provide mutually beneficial feedback and are organised several times a year for the students at the Faculty and the SPs level, as well as at individual teacher-student meetings within the SM.

Planning of students' progress is possible through students' communication with teachers, as well as through the KTU GUIDed mentoring programme.

#### *(2) Expert judgement/indicator analysis*

The Department of Academic Affairs prepares an annual report of the monitoring of the students' learning outcomes once per year. The SPC monitors the students' achievements in the AIS constantly. The results of both monitoring are applied for improvement of study quality. However, it is not clear how these different monitoring systems are integrated and supplement each other as the first system does not include data on individual study fields.

### *3.4.4. Evaluation of employability of graduates and graduate career tracking in the study field;*

#### *(1) Factual situation*

Internal monitoring of alumni employment and careers is carried out through regular alumni surveys. Information is gathered both through personal contacts with alumni and through general surveys of alumni and through information gathered on social networks (LinkedIn, ResearchGate). For this SER, an online survey of 2016-2020 graduates of both SPs was carried out in November 2020 on the platforms apklausa.lt and Google Forms. Graduates were asked about their employment during their studies, after completing their studies, and about their professional career.

Information on graduates' employment and monitoring of their careers is also carried out at least once a year by organising a meeting of graduates, e.g., informal meetings of Environmental Engineering alumni, KTU alumni, and SP Sustainable Management and Production alumni at the APINI. Alumni also interact in the social network group of the Institute of Environmental Engineering.

There is also a career competence development programme at the University, available to every KTU WANTED student. This programme includes career events, a series of events and seminars, group and individual career counselling, and the dissemination of good practises.

The career management system Karjera.lt also provides structured data from career monitoring surveys to find out how graduates of higher education institutions are doing in the labour market, how satisfied they are with their studies, job and career.

Graduates' and employers' views on graduates' preparation and competences after graduation are gathered through formal (roundtables, strategy sessions) and informal meetings, as well as through active discussions with working students, who directly express the needs of their current employers and the competences required for their jobs. The SPC also has representatives of both students and social partners, who provide valuable insights for the improvement of the SP. At least two social partners representing the employers of future graduates participate in the Final Degree Project Defence Committee each year.

## *(2) Expert judgement/indicator analysis*

The employability rate of the both SPs graduates is good as according to the speciality it was 77-84% based on surveys. However, the participation rate was 52-56.7% of the total number of 2016-2020 graduates.

The data on graduate employability provided by the Government Strategic Analysis Centre (STRATA) shows data on General Engineering, which consists of 8 study fields, for which statistics are not detailed separately to isolate data on the careers of environmental engineers. The occupations listed on the STRATA website (environmental protection specialist, ecological engineer) are predominantly occupied by graduates with the first cycle (bachelor's) degree. It is, therefore, not possible to identify which jobs are held by professionals with a master's degree in EE.

Information on graduates' and employers' perceptions of graduates' professional preparation and competences after graduation is gathered through a variety of methods, but not systematically, therefore, they are not very reliable and compatible. The survey of graduates of the SP Sustainable Management and Production in 2020, showed that over 70% of them were fully satisfied with the quality of their studies and that their employers were satisfied with the level of competences they acquired in terms of their professional preparation. Employers believe that graduates of the SP Environmental Engineering have one of the highest- quality engineering backgrounds in the environmental sector in Lithuania.

### *3.4.5. Evaluation of the implementation of policies to ensure academic integrity, tolerance and non-discrimination;*

#### *(1) Factual situation*



The Board of Academic Ethics of KTU assures compliance with the Code of Academic Ethics. Any member of the University's community has a right to submit a report on the fact of academic violation to the Board of Academic Ethics.

By signing the learning agreement and the declaration of academic integrity, the students undertake to follow the academic discipline, the procedure stipulated by the Code of Academic Ethics and the University's other internal legislation, perform the tasks independently and honestly.

The cases of academic violations identified during the assessments are examined by the Commission for Settlement of Academic Violations; it is a permanent commission assembled of KTU employees and a representative of students.

All the University's employees and students, who feel that the situation of the violation of equal opportunities has occurred, have a right to submit a justified complaint to the University. The cases of discrimination, harassment, violations of equal opportunities and the reports regarding the violations of equal opportunities submitted by employees and students are analysed and the decisions are made by the University's Equality Committee assembled by the order of the Rector. There is the electronic system [pranesk.ktu.edu](mailto:pranesk.ktu.edu) or by email [pranesk@ktu.lt](mailto:pranesk@ktu.lt) established for this purpose. All the received reports submitted by employees and students are analysed under the procedure stipulated by the regulations of the University's Equality Committee.

## *(2) Expert judgement/indicator analysis*

The panel finds that appropriate procedures are in places to ensure the effectiveness implementation of policies to ensure academic integrity, tolerance and non-discrimination at KTU. Teachers and students are aware about these procedures. However, in the study field under evaluation, there have been no cases of violations of the principles of academic integrity, tolerance and non-discrimination by students in the last three years.

### *3.4.6. Evaluation of the effectiveness of the application of procedures for the submission and examination of appeals and complaints regarding the study process within the field studies.*

#### *(1) Factual situation*

The University applies the Guidelines for the Submission and Processing of the Students' Appeals and Complaints. Before the submission of an appeal or a complaint, the student has to get acquainted with the documents regulating the area of the alleged violation, and other important information, and, if needed, consult the Administration of the faculty.

An appeal or a complaint is transferred to the head responsible for the area of activities who assembles an interim board of appeal or a complaint settlement commission (consisting of at least 3 members; one of them is a representative of students). If an appeal or a complaint is related to the violation of academic ethics, the document is transferred to the chairman of the Board of Academic Ethics.

The interim board of appeal or the complaint settlement commission analyses the appeal or complaint within 10 working days after the date of the receipt of the properly submitted appeal or complaint, makes a decision and notifies the interested persons. The student, who disagrees with the commission's decision, has a right to apply to the University's Dispute Settlement Commission within 10 working days.

## *(2) Expert judgement/indicator analysis*

All procedures are in place to ensure the effectiveness of the application of procedures for the submission and examination of appeals and complaints. Teachers and students are aware of these procedures. However, there have been no complaint cases regarding the study process from students in the study field under evaluation in the last 3 years.

### ***Strengths and weaknesses of this evaluation area:***

#### ***(1) Strengths:***

1. The intensive use of MOODLE and distance learning tools like Teams, Zoom etc. gives students independent access to the learning resources and extends the possibilities for providing feedback.
2. Good relationship with alumni and social partners which are involved in SPC work, thesis defence committee or supervising of final thesis and can influence the content of study programs based on market needs.

#### ***(2) Weaknesses:***

There are no major weaknesses identified. Only a minor shortcoming is that more attention should be paid to the use of new advanced study methods including use of new software and other IT-based tools for practical application in the environmental engineering field.

## **3.5. TEACHING STAFF**

### ***Study field teaching staff shall be evaluated in accordance with the following indicators:***

*3.5.1. Evaluation of the adequacy of the number, qualification and competence (scientific, didactic, professional) of teaching staff within a field study programme(s) at the HEI in order to achieve the learning outcomes;*

#### ***(1) Factual situation***

The teaching staff of the study programs conforms to a high standard of formal scientific competence and the course teachers fully meet the legal requirements as all or almost 100% have a PhD or higher qualification. According to SER, the majority of the teachers of SP in Environmental Engineering and in the Sustainable Management and Production programmes are professors, 74% and 92%, respectively. Most lecturers are actively involved in research. The h-indexes characterising the publication impact of authors are similar or even higher compared to other educational and research units in the field of environmental engineering in Lithuania. The average ratio of the number of teachers and students in the study field is: 3,44 and 1:2,92 for SP EE and SP SMP, respectively. On the one hand, it allows for the development of intensive contacts and individualised approaches between staff and students, but on the other hand, it may hamper the possibility of funding the teaching process. The list of units included in curricula is as follows: Department of Environmental Technology (ATK), Faculty of Chemical Technology (CTF), Institute of Environmental Engineering (APINI) and Faculty of Mechanical Engineering and Design). It is assumed that both curricula can benefit from a wide coverage of different units, i.e. the best teachers are involved in the curricula. However, this can create administrative problems, especially for a small number of students and limited teaching resources. The latter should be taken as a concern for the future, as SER did not



reveal actual budget or trends in teaching, but it indicated that main income is research funding (at least for APINI up to 80%, unclear for other units). The meeting with students raised concerns that some teachers prefer more research and pay less attention to student progress.

## *(2) Expert judgement/indicator analysis*

In general, the indicators provided for the both SPs, the number of the teaching staff, qualifications and competence are convincing and demonstrate a high level of teaching. SER and the site visit demonstrated that the teaching staff is research oriented and able to cope with teaching research topics (e.g. joint publications and conference presentations with students).

### *3.5.2. Evaluation of conditions for ensuring teaching staffs' academic mobility (not applicable to studies carried out by HEIs operating under the conditions of exile);*

#### *(1) Factual situation*

Staff involved in SPs participate actively in international mobility programs, mainly in the framework of ERASMUS+ staff mobility programme, as indicated in the SER (38 outgoing visits). However, the opposite mobility is not as active (15 visits) and it is not clear how important the benefits of ERASMUS+ mobility are for SPs. Some teachers also participated in the NordPlus Higher Education Programme for Nordic and Baltic universities. Funds have been allocated for attending the conferences and according to SER and site visit, staff is satisfied with the situation. No sabbatical leaves were not revealed in SER.

#### *(2) Expert judgement/indicator analysis*

“Erasmus+” mobility programme was listed in SER as a key option on international mobility, but the Nordplus Higher Education Programme complemented the opportunities for academic mobility, which is a welcome extension. Based on the SER data, it is difficult to assess the benefits and relevance of the teachers coming to SP, as no data were published on the number of lecturing hours, credit points or scientific level of the lecturers, except for the cooperation with University of Basilicata.

### *3.5.3. Evaluation of the conditions to improve the competences of the teaching staff.*

#### *(1) Factual situation*

The University has responded to the recommendations of previous international evaluation(s) and established the Centre for Training and Learning Competences (EDU\_Lab). EDU\_Lab, the Laboratory of teaching, learning and education, introduces, develops and promotes suitable and innovative didactic competencies at the University and conducts the analyses of SPs together with Study Programme Committee and lecturers. The majority of teachers have attended didactic competence development training. The most popular have been ‘Problem-based learning’ and ‘Assessment of student achievements’ while ‘Teamwork empowerment’ has not been as popular. The University also organises in-service training for employees to complete one study module in one semester, funded by KTU and certifying the improvement of their qualification. Unfortunately, SER does not reveal the interest of teaching staff and success using this opportunity.

A real development of scientific competences takes place through participation in international research, e.g. research projects, scientific conferences, expert activities as well as ERASMUS+ programme. Participation in international scientific conferences is rather popular among lecturers based on SER.

#### *(2) Expert judgement/indicator analysis*

The indicators show that lecturers related to SP participate in didactic competence development training organised by the University. However, if only one teacher (or a very limited number) trains his/her skills in teamwork or innovations in studies, the overall profit of SPs is very modest. The scientific competences are more actively developed, in particular through the dissemination of research results at international conferences.

#### ***Strengths and weaknesses of this evaluation area:***

##### ***(1) Strengths:***

1. Both SPs are taught by qualified staff and legal requirements are met. Teachers are actively involved in research and have good opportunities to disseminate the research results at the international conferences and to publish them.
2. Both SPs (study field) have interdisciplinary content and all units involved can share their best teachers and the different opportunities of the units (e.g. lab facilities).
3. The University has developed a good environment for the developing of didactic skills (EDU\_Lab).

##### ***(2) Weaknesses:***

1. There are no main weaknesses identify during the evaluation process. Nevertheless, the panel would like to provide some additional comments to keep the quality of the SPs at the current level. Some preparation is required to address the common problem of declining number of students. The consequence of this is that funding for teaching is likely to be declining, i.e., it could eventually have a negative impact on the well-being and development of SPs.
2. The University also provides valuable support for teachers to develop their didactic competence, but the participation appears to have been somewhat uneven. It is expected that some coordination will be needed to gain critical mass in order to reap the real benefits of training such as "Innovation in Learning", "Empowering Teamwork" and the like.

### **3.6. LEARNING FACILITIES AND RESOURCES**

***Study field learning facilities and resources should be evaluated according to the following criteria***

***3.6.1. Evaluation of the suitability and adequacy of the physical, informational and financial resources of the field studies to ensure an effective learning process;***

#### ***(1) Factual situation***

The University has both invested in the refurbishment of its premises and will continue to invest in the establishment of a multifunctional centre with an integrated library and thematic laboratories covering development, production and demonstration capabilities. Based on the SER and video material distributed to the evaluators, it can be confirmed that modern teaching aids are available for both SPs, including well-equipped laboratories, computer

classes and auditoriums. The laboratories are almost full of different equipment and meet modern standards. The number of available classrooms is quite sufficient for the needs of SPs. Both SPs benefit from the interdisciplinary of SPs, as many laboratories can be used for teaching and research. Students also have easy access to a large number of laboratories in other faculties and business research centres. It is very positive that the University has an Open Access Centre for existing research equipment. There are more than 800 pieces of research equipment which inevitably needs a number of highly competent lab technicians carrying responsibilities particularly about more sophisticated facilities. Students have good access to computer software, library resources (incl. Databases, research journals, digital libraries), MOODLE courses. There are study facilities for persons with reduced mobility etc.

#### *(2) Expert judgement/indicator analysis*

Facilities and information resources available for teaching and research process are adequate and suitable for the operation of both SPs. The panel is not confident enough about the availability of technical staff.

### *3.6.2. Evaluation of the planning and upgrading of resources needed to carry out the field studies.*

#### *(1) Factual situation*

The University's Action Plan 2021–2025 envisages further modernisation and adaptation of classrooms, e.g., multifunctional study room, open learning spaces, creation of an experimental/pilot production centre.

Planning the resources needed for SPs depends on the structure of the SP, i.e. good cooperation between different units is needed. Inherently it is related to the number of students in SPs. SER revealed the funds allocated for the development of SP Environmental Engineering, where the budget line for participation in conferences has been surprisingly high, more than tenfold higher than the increase in the competence of lecturers.

#### *(2) Expert judgement/indicator analysis*

Proper cooperation between different units/parties is needed when planning and upgrading of resources. A large part of the development budget is actually 'a travel money' which indirectly improves staff competences. SER and online site visit did not show the resources available for teaching and other activities or the overall funding trends, so the overall concern is related to the number of students.

### *Strengths and weaknesses of this evaluation area:*

#### *(1) Strengths:*

1. Good planning at the University level and continued achievement in the development of the entire University learning environment.
2. A good opportunity to use several laboratories equipped with a large number of equipment in different units of the University.

#### *(2) Weaknesses:*

There are no main weaknesses identified during the evaluation process, but attention should be posed to the number of students and the associated limited resources for

teaching and learning that might cause tension between with different entities, as resources dwindle.

### 3.7. STUDY QUALITY MANAGEMENT AND PUBLIC INFORMATION

*Study quality management and publicity shall be evaluated according to the following indicators:*

#### *3.7.1. Evaluation of the effectiveness of the internal quality assurance system of the studies;*

##### *(1) Factual situation*

**Management of the studies of the field.** The management of SPs is based on KTU Statute, KTU Provisional Academic Regulations of KTU, the Code of Academic Ethics, LR Law on Science and Studies, KTU Quality Manual and other legislation related to the regulation of higher education, as well as internal regulations regarding KTU study process organisation.

**University level.** The Senate performs the monitoring of changes in the organisation of studies, the management of the package of SPs, the quality assurance, the system improvement and other functions stipulated by the Statute of the University. The Committee for Studies of the Senate considers the SPs submitted for approval and provides its conclusions regarding their establishment to the Senate, analyses the internal quality assurance system in all study cycles and guarantees its implementation, considers and submits the suggestions on the issues related to studies to the Senate.

The Vice-Rector for Studies is responsible for the implementation of University's strategic goals, the development of the vision and strategy of the quality of studies and the standard and system of quality. The Vice-Rector for Studies is the head of the University's Study Quality Committee; members to the University Study Quality Committee are delegated for the University Rector's approval by Faculty Boards on the Deans' recommendation. The objective of the University's Study Quality Committee is to submit the expert proposals related to the issues of the development of the University's studies, the making of the policy of studies and the improvement of SPs to the University's governing bodies.

**First-level academic unit level.** The first-level academic units coordinate and ensure the realisation of the study field SPs and the distribution of human resources. The SP Environmental Engineering is implemented and managed by the CTF. The APINI, in collaboration with the MIDF, implements and manages the SP Sustainable Management and Production.

**Study field level.** The management of the study field SPs is the responsibility of the SPCs (involving social partners, student representatives and teachers) and the respective heads of SPs, approved by the Rector of the University. The SPV are directly subordinate to the Dean of the Faculty and are the chairs of the SPCs. The members of the SPC are appointed for an indefinite period of time, with the possibility of an annual evaluation. Students are delegated to the SPC by the students' unions of the faculties for a period of one year. The composition of the SPC is approved by the Rector of the University on the recommendation of the Faculty Board. The number of SPCs in a Faculty is determined by the Faculty Board. All SPs registered in the same study field assigned to a SPC, except in cases where SPs in the same study field

belong to different academic first-level units. In the latter case, separate SPCs may be formed within each unit.

To meet the needs of the SPs, SP teachers are responsible for the implementation of SMs, formulate the aims, learning outcomes, themes, activities, tasks, study and assessment methods within SMs, ensure that the SP learning outcomes within the SM are achieved, advise students and provide feedback on SMs, submit the topics for final degree projects to the AIS for consideration and approval by the SPC, and supervise students' research projects and final degree projects.

#### *(2) Expert judgement/indicator analysis*

The quality assurance system as described in the SER is well structured and with clear responsibilities for each unit. It is also very good to see that the program also includes a clear responsibility for the implementation plan.

### *3.7.2. Evaluation of the effectiveness of the involvement of stakeholders (students and other stakeholders) in internal quality assurance;*

#### *(1) Factual situation*

The University's internal quality assurance system is described in the Quality Manual. This system is based on the key EU documents of the policy of higher education (Bologna and Copenhagen Declarations, Berlin and Bergen Communiqués, etc.), it complies with the standards and guidelines for quality assurance in the European higher education and the main laws and legislation regulating higher education of the Republic of Lithuania. KTU internal quality assurance system in studies includes the model of the management of studies, the application of the student-oriented educational philosophy, the improvement of the competence of lecturers, the system of the student's success at the University and the development of the feedback and monitoring system. It defined the principles and procedures of the quality assurance in studies and stipulated the regulating documents.

The KTU provides an internal system for quality assurance in studies is based on the 9 principles (Paragraph 377 of SER) that includes the University's vision, mission, values, strategic objectives and the goals. The University's framework of the quality system based on the excellence framework of the European Foundation for Quality Management.

#### *(2) Expert judgement/indicator analysis*

The study program has a good and well-structured plan for the implementation of the quality assurance program.

### *3.7.3. Evaluation of the collection, use and publication of information on studies, their evaluation and improvement processes and outcomes;*

#### *(1) Factual situation*

The information on the SPs open for admission, the admission requirements for the candidates, the tuition fee, the learning outcomes (and their relation to the methods of studies and assessment), the composition of SPs, the data of accreditation, the obtained qualifications and career opportunities, the programmes of the SMs, the values of the SPs, the guest lecturers, the possibilities of optional competences is provided on the University's website.

The website provides the public results of the surveys on studies, the opinion of stakeholders about the relevant competences in the labour market with regards to each SP.

Some of the most relevant and up-to-date information related to the study process, results and cooperation between studies and research are published on the social networks of the units (CTF and APINI), Facebook and Instagram. The head of SPs coordinates the provision of this information. Information on relevant events, social partners opinions on competences required in the labour market, links to opportunities for further development of competences are published on social media. Alumni, students and social partners are also active in these networks.

## *(2) Expert judgement/indicator analysis*

The committee finds that the SPs have a good structure and plan for external communication with stakeholders. They actively use several media platforms. As a recommendation the SP committee encourages the SPs to actively seek new ways to involve their current and former students in this process.

### *3.7.4. Evaluation of the opinion of the field students (collected in the ways and by the means chosen by the SKVC or the HEI) about the quality of the studies at the HEI.*

#### *(1 Factual situation*

The University website publishes information on study programs submitted for admission, admission requirements for entrants, tuition fees, study results (and their links with study and assessment methods), study program structure, accreditation data, acquired qualifications and career opportunities, SMs programs, values of study programs, guest lecturers, options for additional competencies.

The need for new competences is regularly analysed in cooperation with social partners; for this purpose, job advertisements are also analysed. Following the growing demand for skills in software packages, the SP Environmental Engineering has been enriched with a SolidWorks assignment within the SM Modelling of Environmental Processes and Technologies. Currently, two final degree projects using Ansys and Simulink (MatLab) modelling software are being prepared. Starting the autumn semester 2021, it is planned to integrate MatLab assignments in other SMs. To implement the circular economy principles, the aim is to put more water back into productive processes. Social partners highlight the growing need for technological know-how in water recovery. Therefore, the SM Water Resources Engineering of the SP Environmental Engineering has been expanded to cover relevant topics.

The results of feedback are presented each semester at the Rector's office and KTU Students' Association; later, they are analysed at the Deans' offices of the faculties and the committees of SPs. The central administration is responsible for general changes and further actions, while each faculty is responsible in specific cases: the Vice – Rector for Studies, in cooperation with the University's SP Committee, initiates the actions for the improvement of studies. The Department of Academic Affairs considers the results of feedback while planning its yearly actions, the faculty – while preparing an annual plan for the improvement of the quality of the faculty's studies, SPC – while planning the actions for the improvement of the field each year. The achieved results are later reviewed, discussed and used in the planning of further actions for the improvement of studies.



The feedback on the implemented changes is provided in the nearest meetings, taking into consideration the remarks of the interested parties. The MOODLE system contains an installed environment allowing the lecturers to constantly specify the corrections of SMs with regards to the students' remarks. The lecturers can submit their remarks and suggestions in the surveys, during the faculty's meetings and in the preparation of the faculty's annual activity report.

Students' opinions are analysed through general surveys organised by the University and through direct contact with students on issues related to their studies. During the preparation of the self-assessment, an additional student survey was carried out to gather students' views and feedback on issues of relevance to students. The survey was carried out among 10 students (59%) of the SP Environmental Engineering and 13 students (57%) of the SP Sustainable Management and Production. 40% of students in both SPs appreciated the possibilities for students to express their opinions and feedback during roundtables organised by the SPC. There is a mixed feeling about the importance of surveys. In fact, 80% of students in the SP Environmental Engineering, and 70% of students in Sustainable Management and Production recognised the importance of the surveys in improving the quality of the studies. However, only 30% of Environmental Engineering students and 40% of Sustainable Management and Production students obtained feedback from teachers about the improvements implemented following the surveys. The vast majority of students prefers a direct approach with teachers or the head of the SP regarding any issues and expectations within the SP. The engagement of social partners on the SPs is also positively perceived as an opportunity for students to further develop.

#### *(2) Expert judgement/indicator analysis*

The SPs have a good overview of how they work with collecting information including students' opinions. It is however not clear how the study program evaluates the input.

#### ***Strengths and weaknesses of this evaluation area:***

##### ***(1) Strengths:***

1. A quality assurance program which also includes an action group with responsibility for implementation of identified actions.
2. Solid quality study program with respect to information flow.

##### ***(2) Weaknesses:***

Although no main weaknesses have been identified and the teaching continuously updated, students perceive the content of the module be quite static and rigid and not able to adapt quickly with the necessary changes required by the stakeholders and society at large.

## IV. EXAMPLES OF EXCELLENCE

**Core definition:** Excellence means exhibiting exceptional characteristics that are, implicitly, not achievable by all.

Good participation on International funded research projects (i.e. Horizon 2020). Excellent links with other universities in Europe and in particular the joint PhD Programme with the University of Bologna (Italy).



## V. RECOMMENDATIONS\*

Evaluation Area	Recommendations for the Evaluation Area (study cycle)
Intended and achieved learning outcomes and curriculum	The SPs may consider to further enhance the focus on circular economy and adopting more flexible and agile education and learning methods to prepare the students better for the professional life they meet upon graduation.
Links between science (art) and studies	Promote the publication of the results of Master thesis on international conferences. Research and teaching need to be further combined because they provide mutual advantages.
Student admission and support	There is an increased interest and awareness on environmental issues that should be leveraged to increase the number of student applications and admission.
Teaching and learning, student performance and graduate employment	More attention should be paid to the use of new advanced study methods including use of new software and other IT based tools for practical application in the environmental engineering field.
Teaching staff	Plans to attract good researchers to replace staff that will retire soon are necessary.
Learning facilities and resources	Increasing the number of students would ensure better funding for laboratories and funding for teaching in general.
Study quality management and public information	The program should move away from only traditional teaching methods and feedback systems, which are static and rigid, towards a broader spectrum of feedback and teaching methods and assessments.

\*If the study field is going to be given negative evaluation (non-accreditation) instead of RECOMMENDATIONS main **arguments for negative evaluation** (non-accreditation) must be provided together with a **list of “must do” actions** in order to assure that students admitted before study field’s non-accreditation will gain knowledge and skills at least on minimum level.

## VI. SUMMARY

### **Main positive and negative quality aspects of each evaluation area of the study field Environmental engineering at Kaunas University of Technology:**

Main positive quality aspects:

- The study programmes are aligned with the needs of industry and social partners. The study programmes are also well structured and supported by a convincing quality assurance program.
- The facilities are fit for the purpose and there are several laboratories equipped with a large number of equipment available for staff and students.
- Good research outcome and good internationalisation with some strong links with international partners.
- The University has ambitious mobility plans for staff and students supported by a number of agreements with international partners. There are several good promoting events to disseminate such opportunities to students and staff as well.
- The joint PhD programme with University of Bologna represents excellence.
- Students are enthusiastic about the SPs.
- There is a strong relationship with alumni and social partners which are involved in Study Program Committee work, Final Degree Project Defence Committee or in supervising final thesis.
- The Sustainable Management and Production represents an excellent example of interdisciplinary study that allows to prepare students for solving problems in a complex environment.

Room for improvements

- There are some concerns over the sustainability of the programme due to the very limited number of students enrolled on the SPs.

Expert panel leader

Prof. dr. Edoardo Patelli